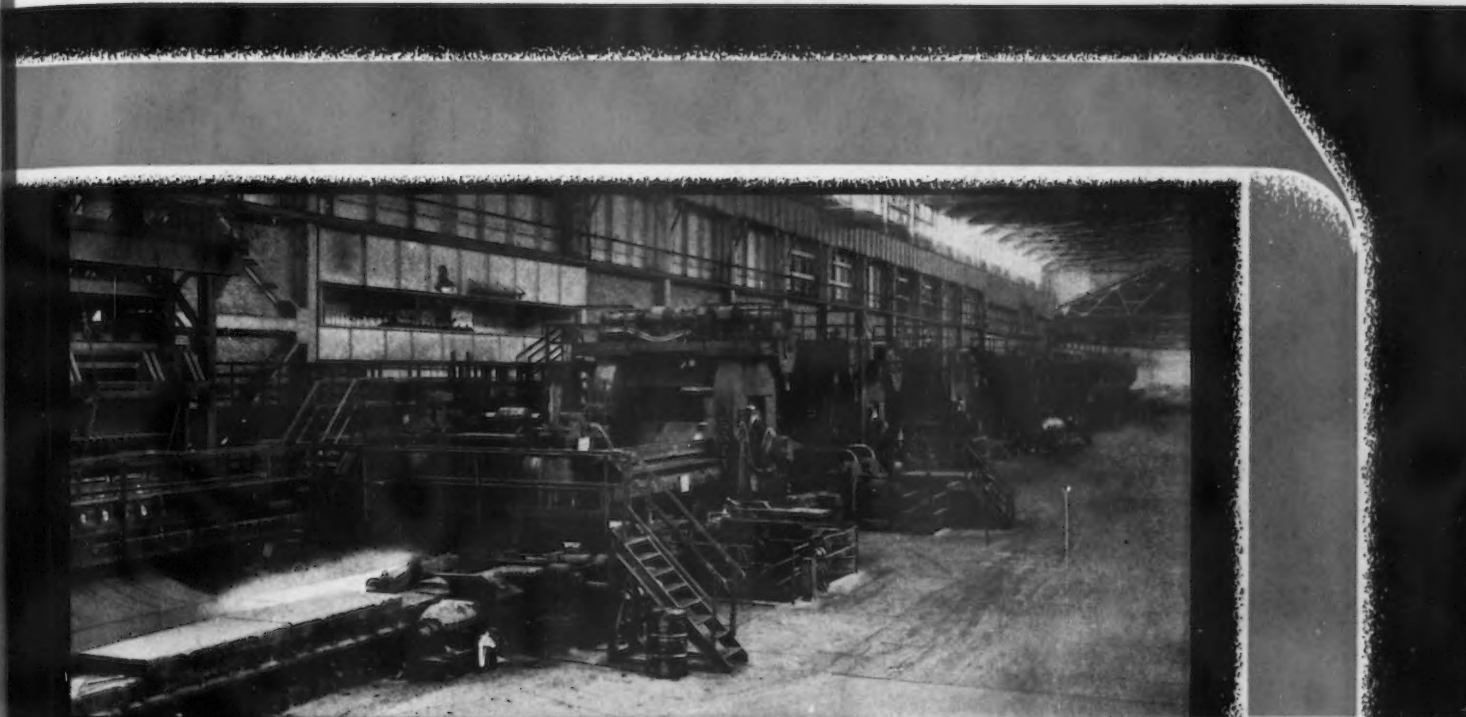


THE IRON AGE

PRODUCTION -- MANAGEMENT

OCTOBER 12, 1933

PROCESSES -- NEWS



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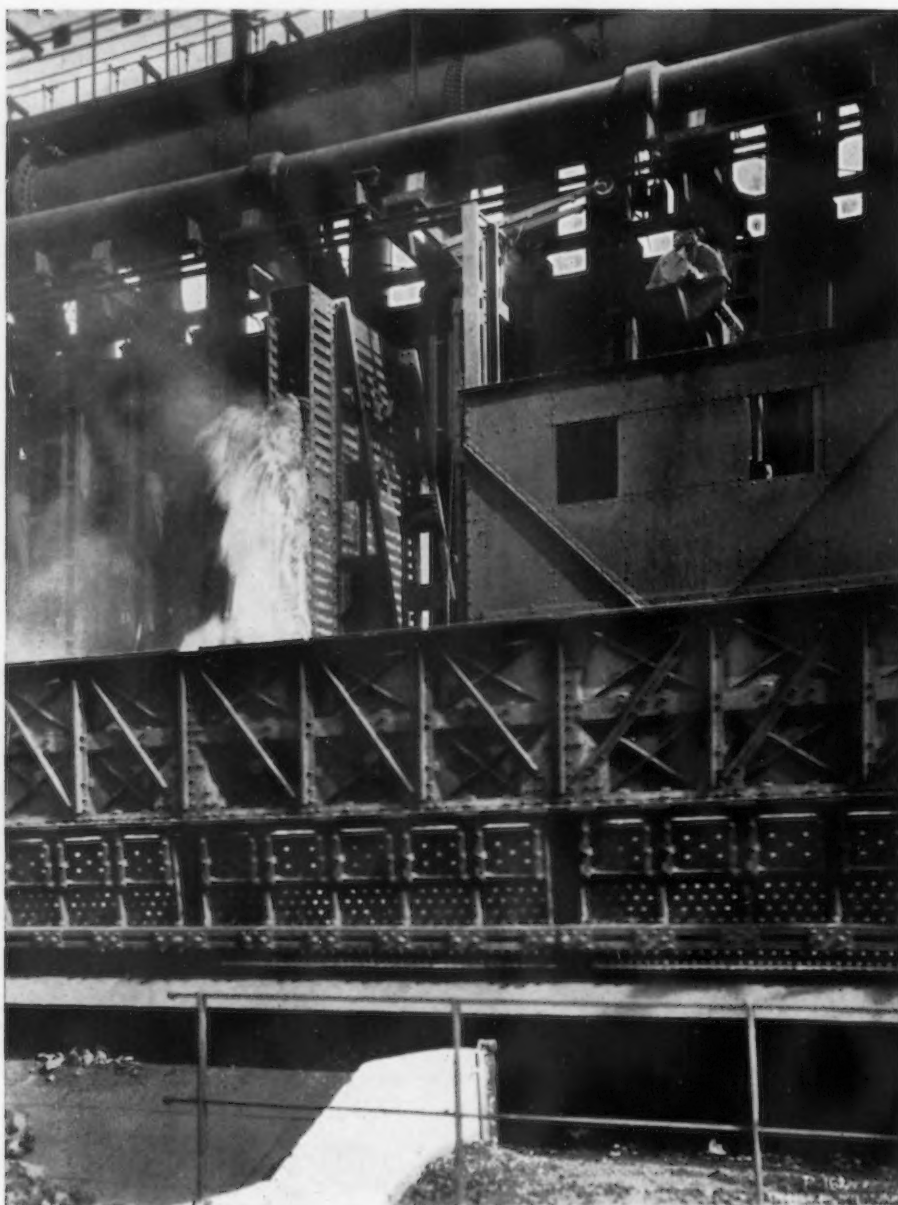
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OCTOBER 12, 1933

ESTABLISHED 1855

Vol. 132, No. 15

Take Off the Ball and Chain

INDUSTRY cannot arise and walk until both of its legs are pulled out of the mud.

Under the aegis of NRA the consumer goods leg of industry has been substantially liberated. But the capital goods leg, equally important and much more deeply imbedded, has failed to budge.

In normal times, from the standpoint of employment in round numbers of workers, each of these two legs was approximately equal in length and in strength. During the depression, also from the employment standpoint, the capital goods leg of industry sank into the mud about three times as far as did the consumer goods leg.

The greater part, by far, of our remaining unemployment slack, which must be taken up before recovery can be accomplished, is associated with the capital goods industries and its related or dependent activities.

THE Administration now recognizes these facts. That is why it is fostering the buying of railroad rails and equipment and lighting a bonfire under the tail of the public works mule.

But the Administration also realizes that railroads and post offices and slum clearance and new roads will not suffice to pull out the capital goods leg and that for the success of NRA it is absolutely necessary that private enterprise shall resume its normal equipment replacement procedure.

To this end the Recovery Administration is broadening its campaign to stimulate buying to include urging the purchase of capital equipment goods.

While this is gratifying to those who believe it indicates the laying of the ghost of an implied moratorium on improved equipment thought to have been favored by certain prominent Admin-

istration members, it is not likely to be effective for the following simple reasons:

THE great bulk of new capital equipment goods must be financed through the sale of new stocks or long term securities. Industry's ready money is needed for other purposes, such as financing higher wages under codes.

Selling or issuing of new stocks or long term securities has been effectually prevented by the passage of the Securities Act of 1933. Admirable as was its purpose in protecting investors from fraud or deception, the terms of this act are so broad and stringent and subject investment bankers, as well as the officials, directors, accountants and engineers of issuing companies to such legal hazards for acts beyond their own control as to absolutely bar the door against the much needed flow of new long term money.

UNTIL this Securities Act is properly amended, attempts to stimulate the private buying of capital equipment goods in any adequate measure will be futile. We may convince every responsible industrial executive that it is his duty to buy new equipment and that the purchase will be profitable and patriotic. We may soften the hearts of our bankers. We may even develop a public demand for investment securities. But as long as the shadow of endless litigation overhangs those engaging in the search for new long term money, it will not be sought nor will capital goods be bought except through Government financing.

All of the public and private financial elephants of America pulling together are not strong enough to free industry's capital equipment leg from the mud of depression until Congress cuts from it the ball and chain which it applied in the form of the Securities Act of 1933.

Railroad Car Situation Involves Many Problems

THE recent announcement by President Roosevelt that a plan to finance new railroad rolling stock out of emergency public work funds is being considered has led to much conjecture regarding the amount and character of equipment that will be bought. As regards locomotives the prevailing opinion is that as soon as the roads have enough traffic to utilize all their modern motive power, orders will be forthcoming for additional locomotives of the latest and most efficient type, because such units will show large savings if they can be used to capacity. Expenditures for freight cars usually exceed those for locomotives, and normally amount to over \$200,000,000 annually. Discussion of the prospects for the purchase of freight cars in the immediate future brings out many divergent opinions. The suggestion that the Federal Coordinator of Transportation may arrange for the purchase of cars to be leased to the railroads implies that the individual roads may not desire to buy at this time. The situation as a whole is made uncertain by numerous disturbing factors which have not affected the freight car market heretofore. Their effects will be felt by the railroads and perhaps to a greater degree by manufacturers whose products are used by the railroad car industry.

Any attempt to forecast the amount of freight car purchases that may be expected in the immediate future from a statistical standpoint seems futile. At present the weekly carloadings are only about 55 per cent of the maximum that the railroads moved in 1929. Yet the surplus of freight cars is decreasing considerably. Furthermore nearly 15 per cent of all freight cars are in bad order and 11.2 per cent or 229,000 require heavy repairs. The railroads will need to place large orders for material to bring the percentage of bad order cars down to the normal of about 6 per cent. Many of the cars requiring heavy repairs may be scrapped and replaced with new equipment.

Volume of Traffic and Number of Cars

There is no definite correlation between the volume of freight traffic and the number of cars which the railroads require. For example, in the year of maximum traffic, 1929, the net ton miles exceeded the wartime peak of 1918 by 10 per cent. The capacity of freight cars in the latter year was 9 per cent greater but the

STIMULATION of the capital goods industries through railway rehabilitation is one of the major present movements in the recovery program. The initial step is now being taken in the form of a gigantic steel rail program under Government aegis.

But beyond the rails, or upon them, are as large or perhaps larger opportunities for reemployment through the rehabilitation of motive power and rolling stock. Undoubtedly this will be the second step.

It is with the possibilities involved in this second step that Mr. Stuebing deals in this article.

number was less by 48,000 or about 2 per cent. Yet in the period from 1918 to 1929 domestic orders for freight cars totaled over one million cars. Again, the traffic of 1929 was less than one per cent more than that of 1926. The number of revenue cars decreased 71,000 during that period, yet domestic orders in 1927, 1928 and 1929 totaled 234,000 cars. Under present conditions with traffic increasing in varying amounts in different territories, and with car service rules requiring home-routing of cars, statistics for the country as a whole are likely to be misleading because certain roads may need additional equipment even though there is a large surplus as regards certain types of equipment as in certain sections. Reports have been heard recently that several roads had intended to buy freight cars but their purchases have been postponed because of the possibility that all freight equipment might be pooled. While many railroad officers admit that pooling of freight cars is desirable from the operating standpoint, their opinion is almost unanimous that pooling tends to

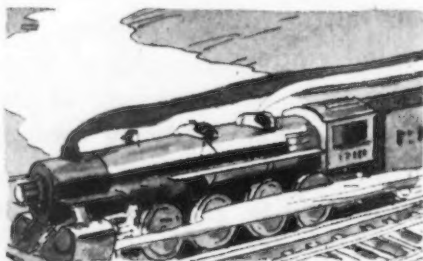
bring about a low standard of maintenance, and that this disadvantage outweighs the possible savings in operation.

Although there is much difference of opinion among railroad men as to the amount of freight equipment that may be required, there is even greater divergence as to the type of cars that should be bought. There are three major problems involved in the design and construction of freight cars that the railroads are attempting to solve: the efficient and economical handling of l.c.l. freight, the reduction of the empty weight of the car, and the elimination of corrosion. Any one or all of these factors may in the near future result in radical changes in the form and size of cars and in the materials of which they are constructed.

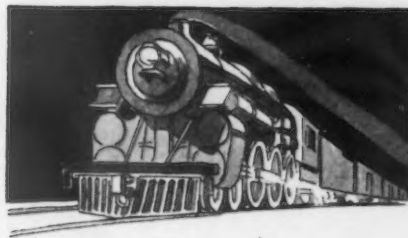
Railroads Spurred by Motor Truck on L.C.L.

In the handling of l.c.l. freight the railroads are faced with the necessity of improving their service and reducing costs to meet the competition of highway trucks. The number of cars of l.c.l. freight handled in 1930 was greater than in 1921, but the total tonnage was about 30 per cent less and the tonnage per car was 36 per cent less. In 1931 26 per cent of the freight car loadings were l.c.l. freight, with an average load of about 4700 lb. In other words 26 per cent of the car loads made up only 2.5 per cent of the freight tonnage and the dead weight of the car averaged about nine times the weight of the lading. Under present operating methods l.c.l. freight is scarcely remunerative, and the railroads have difficulty in competing with motor trucks.

Numerous changes in equipment and methods have been proposed to improve the efficiency of l.c.l. service and to reduce the cost. Some railroad men advocate the use of lightweight cars, of small capacity, but otherwise similar to the present standard construction. Others believe that a small four wheel car without trucks would be practical and more economical. Such light cars could not withstand the severe impacts of heavy cars in ordinary freight service and would therefore be handled in special trains at high speed. The container car, with removable sections which can be carried on highway trucks, has many adherents, because it is adapted for



By A. F. STUEBING



Conflicting Forces Affect Immediate Purchases; Types of Cars and Materials

May Change Railroading

store-door delivery. Probably all of the types mentioned will be tried by the railroads and whichever proves most satisfactory should be widely adopted.

Rust is the Big Depreciation Factor

Rapid deterioration due to rusting is an undesirable feature of steel cars which the railroads have been striving to overcome. Analysis of car repair expenditures shows that rust and decay are responsible for 30 per cent of the total cost, or more than one hundred million dollars a year. Some improvements have been made in protective coatings and freight car sheets are generally made of those types of carbon steel which show relatively low rates of corrosion. Furthermore the standard of freight car maintenance in recent years has been the highest in the history of the railroads, so it cannot be said that cars have deteriorated due to neglect. In spite of these favorable factors many cars only eight to ten years old are found in such bad condition that the entire body should be replaced, and in some cases the cars are not considered worth repairing. Excessive repairs and rapid depreciation, both due to corrosion, result in very high costs of maintenance for freight cars for certain classes of service.

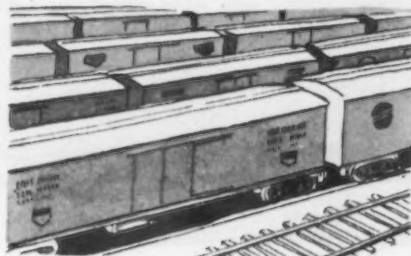
The problems involved in reducing the weight of freight cars are made difficult by the operating requirements that must be fulfilled. Any car that is placed in unrestricted service with existing freight cars, to be hauled in long trains and switched rapidly, at terminals, must have a "backbone" and draft members nearly equal to present standards, otherwise it cannot withstand the shocks of service. The lighter car must not cost much more to maintain and its useful life must not be much less than that of the standard car, or the operating savings will be offset by increased costs for repairs and depreciation. A car of smaller capacity than the present standard would be suited for l.c.l. shipments, but if the capacity is de-

creased very much the car would not be adapted for some bulk shipments and the ratio of empty mileage to loaded mileage would become greater, thereby increasing operating costs.

Weight Decrease Means Cost Increase

There is little opportunity for reducing the weight of freight cars without increasing maintenance costs or shortening the life of the equipment unless the first cost is increased. Therefore in analyzing the possibilities of effecting economies by changes in design or materials it is important to know how much can be saved by a given reduction in weight. This amount will vary widely for different types of equipment and different railroads. It will be greatest where a large proportion of the car loading is at the maximum capacity of the car and where the ratio of loaded to empty car mileage is high, particularly on roads which have a large proportion of their freight movement in full tonnage trains and which also have high costs per train mile or per ton mile. The problem involves many variables and some data not now available would be required for an accurate solution. For the United States as a whole, the average saving that would have been effected by a reduction of one ton in the weight of each freight car under the conditions of traffic and costs which existed in 1930 is calculated at about \$18. Under the most favorable conditions this might increase to about \$50 but for some types of cars on certain roads the saving might be as little as \$5.

The many men in the railroad and



car building industries who have been trying to determine what types of cars would most satisfactorily meet the changing requirements of freight service have come to many different conclusions. Anyone would be rash who would attempt to predict definitely what changes will be made in design and construction. Whether the type and size of freight cars will change radically seems very uncertain. As to materials, recent developments suggest that the era in which freight cars were made almost entirely of rolled carbon steel plates and shapes is coming to an end. There are three materials which may replace rolled carbon steel because they would decrease corrosion and afford opportunity for meeting strength requirements with a lighter structure.

Possible Changes in Design and Construction

One among a number of possible changes in freight car construction lies in the increased use of cast steel. Some ore cars and hopper cars have already been built with centersills and hoppers in a single casting. The substitution of castings for built up structures of rolled sections and plates results in a moderate decrease in weight and a reduction in the rate of corrosion. The first cost should not be much greater than that of the ordinary construction. If produced in quantities, locomotive bed castings combining frames and cylinders have proved very satisfactory, consequently the railroads are likely to be receptive to proposals for the extension of similar construction to freight cars.

The use of rolled sections of heat-treated aluminum to reduce weight and eliminate corrosion is now receiving considerable attention. In view of the fact that the price of freight cars in recent years has been about 4.6 cents per pound, the price of aluminum might seem prohibitive. However because of the relatively great reduction of weight that can be effected and the possible resultant

(Concluded on Page 68)

Heat Treating and Carburizing at National Acme Plant

By F. L. PRENTISS

ALL heat treating work involving a wide range of operations by various methods for a wide variety of production work, including hardening of high speed steel, is combined by the National Acme Co., Cleveland, in one heat treating department under a recent rearrangement of its heat treating facilities. In that connection some new furnace equipment was installed. The present facilities include electric and gas fired furnaces, lead pots, and salt and cyanide furnaces.

The company formerly had a heat treating department for its Product Division and a second for tool hardening. About 18 months ago these two departments were merged in the heat treating department for products and after the removal of the company's automatic screw machine plant to Cleveland from Windsor, Vt., last March, the Windsor heat treating equipment was added to the depart-

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HEA T treating of its machinery parts, its other manufactured products, and its factory cutting tools, and heat treating on contract for outside companies, including carburizing facilities, are now all merged in a single department by the National Acme Co., at Cleveland, with metallurgical and chemical laboratories in the center of the department. Features of the plant include the conversion of a fuel-fired furnace into an electric one, using a stainless iron electrode, and electric-furnace natural-gas carburizing equipment.

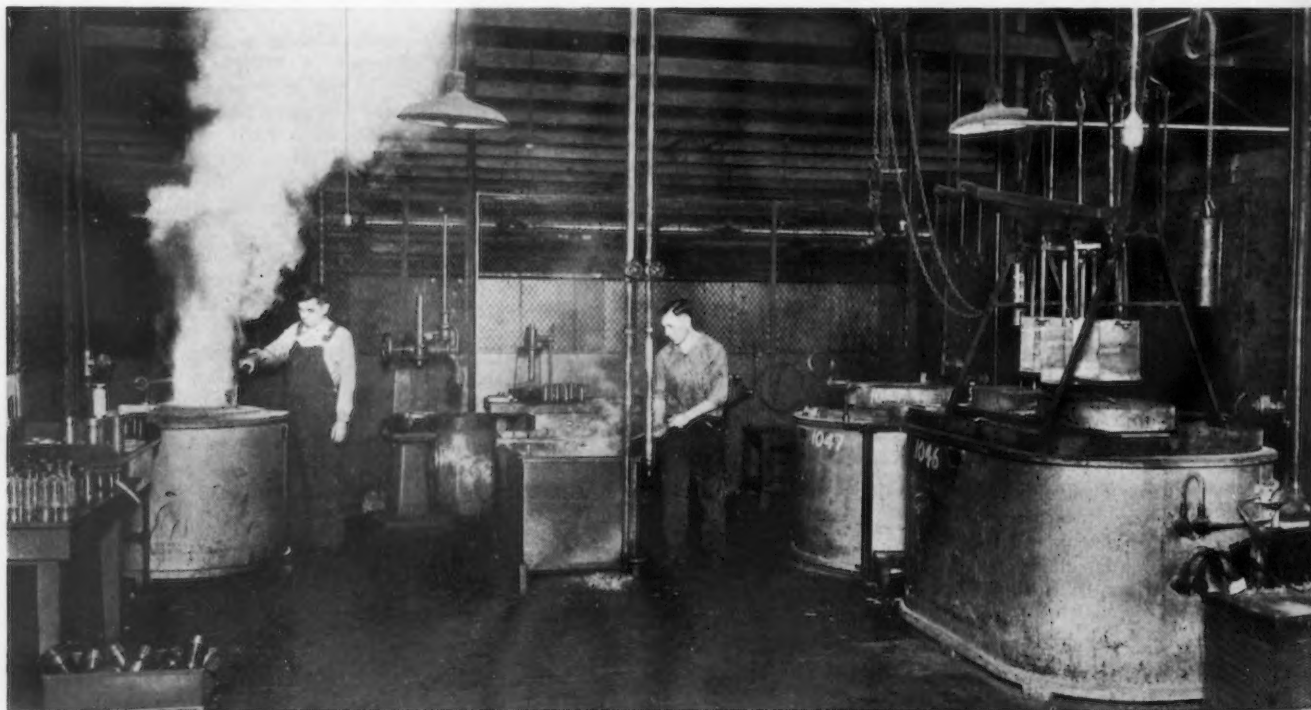
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ment and other apparatus was installed for the heat treatment of high speed steel collets and all parts used in the manufacture of automatic machines that require heat treating. All the newer furnaces are provided with automatic temperature control. Lead pots are controlled by two pyrometers, one for the heating chamber and one for the bath.

Three Grades of Hardness for the Collet

Methods for heat treating collets and collet pushers are of unusual interest because of the operations to which the pieces are subjected. Hardness in three grades is required for the collet, one for the head, less hardness for the shank and a soft steel threaded end that requires no treatment to produce hardness. The pushers usually are given the same treatments.

This heat treating is done in two



COLLETS requiring three degrees of hardness are treated in two lead pots at the right, one for preheating and the other for hardening and are then given tempering treatments in the Homo furnace at the left.



HIGH-SPEED tools are also hardened in a Lavite furnace that has been converted from a fuel fired unit to an electrically heated furnace. Work is preheated and drawn in a Homo furnace.



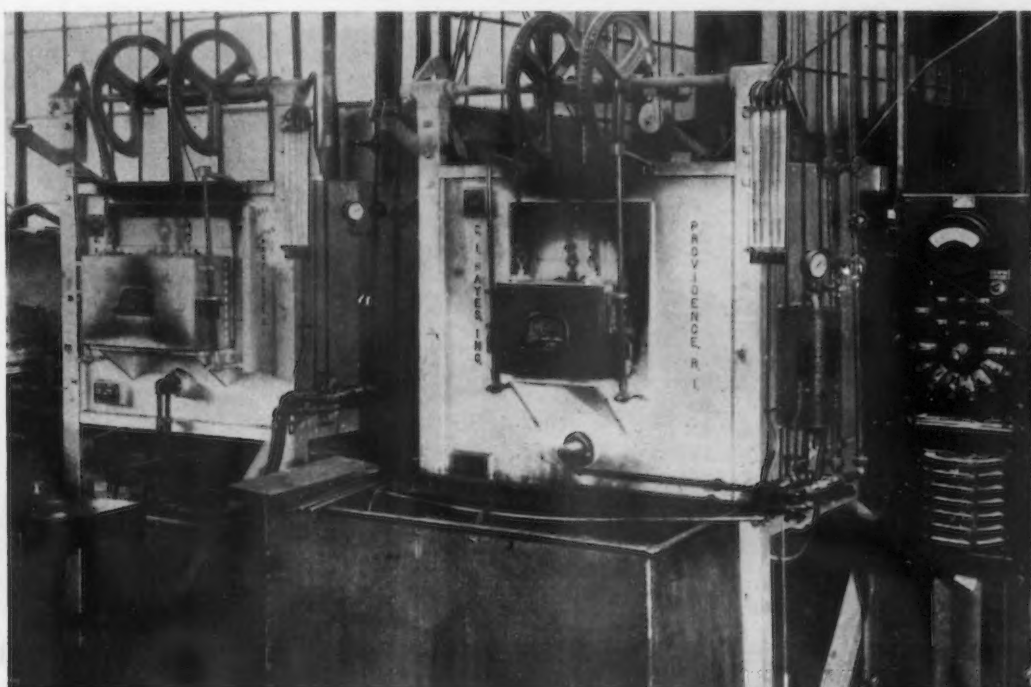
electrically heated lead pots supplied by the American Electric Furnace Co., one for preheating and the other for hardening and a low heat Homo furnace for drawing. The head of the collet is heavier than the body or shank, being both thicker and larger in diameter. Were the collets completely submerged in the hardening

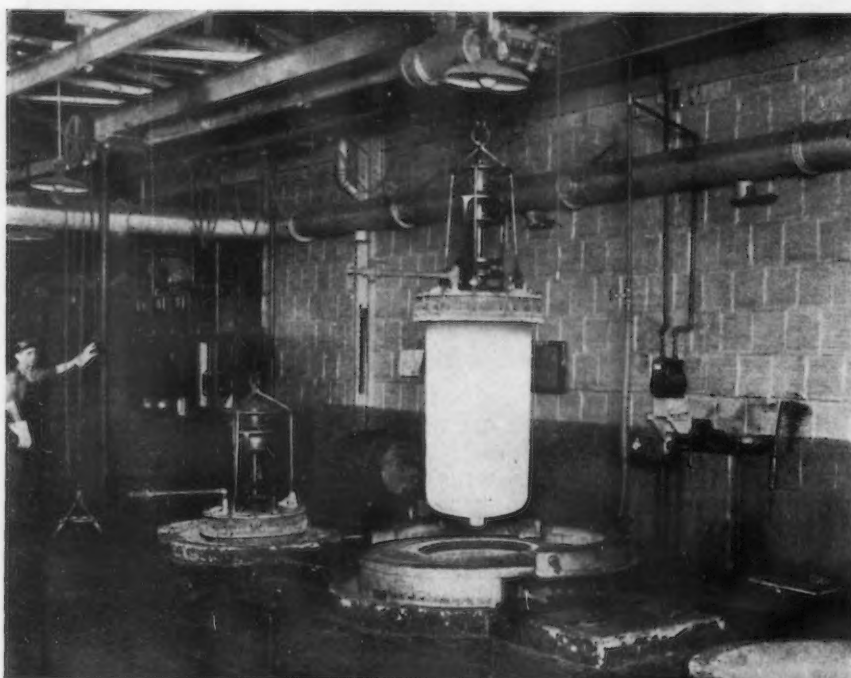
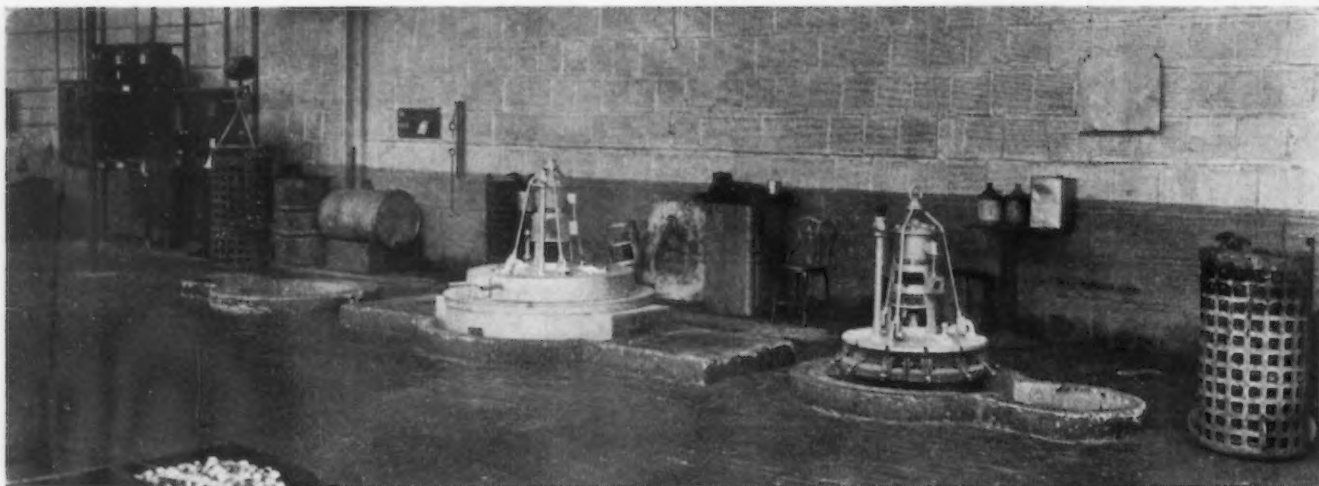
pot without any preheating the shank would become overheated by the time the heavier end had been brought to a hardening temperature. Preheating also permits quicker heating of the heavier end section when the collet is submerged in the hardening bath.

The collet is lowered in the preheating bath by being placed in a

suspended counterweighted rack. After the preheating the head and shank are heated in a high-temperature pot. During this operation the piece is held with tongs and the lower portion, which includes the head and shank, is submerged in the bath, it being necessary to keep the threaded end soft and free from distortion. After harden-

PART of the high-speed tools are hardened in an artificial atmosphere in two electric furnaces, one a preheating furnace and the second a high temperature furnace.





ing the collet is given three tempering treatments in the Homo furnace and lead pot to provide the desired hardness on the head and a spring temper in the shank. Rockwell tests are made to assure proper hardness.

Two Methods of Hardening Cutting Tools

Two methods are used for hardening high speed steel forming tools, milling tools, taps, chasers, trimming dies and the like. Two curtain type electric furnaces, built by C. I. Hayes, Inc., recently were installed for hardening high speed tools. The other method is hardening in a salt bath by the Lavite process developed by the Bellis Heat Treating Co., the same name being applied to the furnace and type of salts used.

In the curtain type of furnace air is excluded by a curtain of burning gas in front of the furnace chamber, thus excluding oxygen and controlling the atmosphere within the heating

chamber and preventing scaling and decarburization. One of the curtain type furnaces is used for preheating, the heating period depending on the work. The second furnace is a high temperature hardening furnace in which the tools are hardened, the time depending on the nature of the piece.

Artificial atmosphere is produced in a combustion chamber and the mixture is regulated by valves at the side of the furnace. In the preheating furnace an atmosphere is produced which is slightly reducing. In the high temperature furnace the atmosphere is reducing to the extent of 9 to 10 per cent carbon monoxide.

Directly in front of the hearth is an oil quenching tank in which the tools are quenched on being taken from the furnace.

The Lavite furnace, formerly fuel fired, has been converted into an electric furnace with a rather novel way of heating the molten Lavite solution used in the bath. An electrode, which

ECONOMIES have been effected and the product has been improved by the substitution of an electric carburizing furnace for pack type gas fired furnaces. Heat from the charge is used to preheat the next charge by placing the retort on leaving the furnace in one of two connected pits, the other pit containing the basket with a new charge which absorbs the heat from the retort.



is a bar of stainless iron $1\frac{1}{2}$ in. in diameter, extends down into the 8 in. diameter by 12 in. deep pot within 2 in. of the bottom and the pot serves as the cathode. The resistance builds up the heat of the bath to the required temperature.

The tools are first preheated at 20 to 90 min. in a Homo furnace, the time depending on the size of the work. Then they go to the first Lavite bath for further preheating and remain in the bath from 1 to 7 min. They then go to a high temperature bath where they are hardened. The work is kept in this furnace for one-half the time that it is in the Lavite preheating furnace. No variation in the predetermined heating time in either the preheating or high temperature bath is allowed. An electric clock rings a bell as a signal for the operator to remove the tools from the bath. After leaving the high temperature bath the tools are quenched in a third Lavite bath. They remain in this bath until their temperature is reduced to that of the bath and are then quenched in oil. The tools after quenching are drawn in a Homo furnace.

The work is handled in and out of the baths by being strung on wires of low carbon content.

Current for the Lavite furnace is stepped down from 440 to 12 volts. An amperage of 21 is maintained for preheating and of 52 for the high heat.

Uniform hardening and clean work are produced by the Lavite process. With the work submerged in the bath it is not attacked by the atmosphere and decarburization and oxidation are

avoided. The use of this process is found particularly advantageous in hardening such tools as thread chasers having very fine teeth. Comparing the two methods of hardening high speed tools the company finds that the Lavite process has the disadvantage of being more expensive, particularly when production is low. Based on the results of its experience with the two methods of hardening high speed steel the company is confining the use of the Lavite process to large production and is using the Hayes curtain type furnaces for small production.

Treating Machinery Parts

Adjoining the curtain type furnaces are three furnaces for heat treating machinery parts and small special work. Two are gas fired and one is a Hevi-Duty electric furnace. Machinery parts and high speed tools and other work that requires drawing after hardening are drawn in four Homo furnaces.

Most gears are hardened in a salt bath which may be either neutral or slightly carburizing. Gears of S.A.E. 3115 steel are hardened in weak cyanide after carburizing and then drawn to required hardness. Gears of S.A.E. 4150 steel are hardened in a salt bath and finished machined after drawing. Gears are quenched in either oil or water, depending on the degree of hardness required. Small work such as cap screws and some nuts are hardened in a battery of 6 cyanide pots.

Natural Gas for Carburizing

Carburizing for the most part is done in a pit type electric carburizing furnace of 66 kw. capacity built by the Hevi-Duty Electric Co. A feature of the operation of this furnace is that natural gas recently has been substituted for the special oil that is



provided as a medium for creating the required artificial atmosphere, the gas being found much more economical.

After the treatment both the retort and the basket of work are raised from the furnace pit and placed in one of two adjoining cooling pits. At the side of each cooling pit and connected to it through an open space is a smaller preheating pit which is of sufficient size to hold the basket in which the work is loaded in the retort. Heat from the retort in the cooling pit is absorbed by the parts in the basket in the preheating pit. Two retorts are provided for the one furnace, one being in the cooling pit while the other is in the furnace. The furnace is served by an overhead electric crane.

While the furnace charge is being brought up to temperature the carburizing medium is not used. As soon as the carburizing temperature is reached the gas is turned on and carburizing starts. The content of the case is controlled by the rate of the flow of gas or by diffusion of the carbon in the case near the end of the carburizing cycle by reducing the gas flow. It is found possible to get a case with a carbon content of 0.90 to 1 per cent and even up to 1.20 per cent if desired. Control of the depth of penetration is important and this is kept within limits of 0.015 in.

This method of carburizing is found to have various advantages over the pack method, including more uniform work, closer control of the case depth, type of case and also economies in production. Formerly the plant used eight pack type gas fired carburizing furnaces but the installation of the electric carburizing furnace has permitted the discontinuance of five of these furnaces. Only one-half of one workman's time is required to operate the electric furnace.

Hardening Screws and Bolts

Equipment for hardening cap and set screws and bolts is arranged for continuous production and for the efficient handling of the work in straight line through the various operations. This consists of two duplicate units located side by side. The first step is hardening in one of two American Gas Co. continuous automatic gas fired tilting type rotary furnaces, 12 ft. long and 18 in. in diameter with pyrometric control, thermocouples being located at the center and discharge ends. A bucket filled by the operator at the loading end is hoisted by a motor operated cable to the loading position where the contents of 75 to 100 lb. are dumped into the furnace chamber, which is a spiral drum. The furnace is operated at variable speed, the time of work remaining in the chamber depending on the class of work. Cap screws usually are kept in the furnace 28 to 31 min.

Work is discharged from the furnace through a chute to prevent exposure to the air into quenching tanks in which oil or water is used. The cooling medium is kept cool by being circulated through water cooled pipes. An endless belt conveyor carries the

(Concluded on page 74)



THE department for continuous hardening of cap and set screws. The work is routed in a straight line going progressively through the two rotary tilting furnaces at the left, quenching tank, drawing furnace, another quenching operation and then a dumping jig, which empties the basket of work into shop pans.

An Electric Power Famine

By FRANCIS JURASCHEK

TWO of the most grievous economic faults which plague the use of electric power by the industrial operator who buys his energy from a central station are factors which have resulted mainly from careless planning, haphazard growth, or both together.

High demand comes from the unorganized piling up of many and varied current requirements to the point where, at irregular intervals, excessive peak loads are developed, creating momentary needs for energy out of all proportion to any normal average of demand. Low power factor is the result of an unbalanced use of induction motors principally, but may also be caused by an unscientifically developed layout of wiring, motor connections, transformers, control equipment and induction apparatus in general, of such a nature that the "wattless" current connected to the supply lines bears an unreasonable proportion to the current that does the real work.

In both cases the central station must stand ready at all times to deliver a much larger percentage of electric power than is actually converted into work in the industrial plant. Thus the real usable generative capacity of the utility is to a large extent tied up unproductively . . . and when a central station has contracted for the sale of all its available generative capacity, it is still in the unfortunate position of not being able to see that total capacity completely utilized.

It is because of this fact that a majority of the central stations are now enforcing most vigorously the rights they have acquired of making customers pay "demand" rates in addition to their bills for power consumed in the one case, and in the other of penalizing those customers who operate under low power factor conditions. During the past three years, when industrial energy consumption was at a low ebb, many utilities were lax in enforcing these consumer penalties; but with an electric power famine near, they are once more using them as a rod to stimulate consumer cooperation.

For, with no surplus capacity in sight, the correction of high demand

and of low power factor conditions will inevitably be the logical means whereby present customers may secure more power for themselves, and future customers be given the opportunity of getting the power they will need to operate plants. In fact, as the need for additional power develops, not only will the utilities endeavor by every means possible to increase the present penalties so as to force a more even distribution of output, but it may even be that legislation will be enacted that will require every power consumer to correct his shortcomings under pain of being refused any current at all.

The contingency will be acute this winter. Public utility representatives are already taking stock of the conditions in their territories, by searching surveys of conditions of operation in their customer's plants. The screws may be applied at any time. That is one reason for careful consideration of these problems immediately. The other reason is one which every foresighted manufacturer will grasp without argument. . . correction of poor conditions will not only release more power, which he could not otherwise get, but will mean money in his pocket, due to the elimination of the rate penalties.

Without further apology then, let us examine the problems.

High Demand Rates

The use of electrical energy in the industrial plant may take a number of different forms. The larger the plant, and the more varied the industrial processes, the more likely is that use to pile up occasionally into heavy peak loads. It is seldom, however, that conditions approaching those peak loads are to be found continuously throughout the work-week.



Assume, for example, that the normal continuous load is made up of the energy required to run 25 motors, each of which drives machines operating practically constantly. In addition, there may be an air compressor, several pumps, an electric furnace for melting, heat-treating or annealing purposes, a welder, fans, heaters, and of course, the lighting system. In the course of an average month, the actual consumption of current, as indicated by a wattmeter, may be only 135,000 kwhr., or an average kilowatt demand of, say, 660 kw. But at certain widely varying short periods of time during that month, every piece of electrically operated equipment in the whole plant, plus the lights, may be connected; and the maximum kilowatt demand may build up, for a 15-min. interval, to 960 kw. This may happen only a half dozen times during the month, and the total time during which 960 kw. capacity is drawn upon may only be 2 hr. altogether. Yet the central station will render a double bill for services during that month, one part based on the actual amount of energy consumed, as determined by the wattmeter readings, and the other based on the maximum "demand" made during the month, as recorded by a demand meter which shows the highest point reached during the billable period.

From the manufacturer's standpoint there are two evils which result from this. The first lies in the generative capacity tied up at the central station, in readiness at a moment's notice to satisfy his maximum demand for energy. The central station does not know when it will be called upon to deliver this extra energy, and consequently, must hold it in reserve. The manufacturer does not use it, except for a very minute fraction of his working month, but the mere fact that he may need it at any moment, bars others from using it. Consequently the manufacturer must pay for his privilege, and this fact introduces the second evil. In addition to his metered current charges, he must pay (almost universally) an extra "demand" charge.

Suppose his average rate for metered current to be 2c. per kwhr., and his demand rate \$1.25 per kw. His

ine Approaches!—Part II



The High Demand and Low Power Factor Situations

total bill for the imaginary month discussed above would then be 135,000 kwhr. at 2c., of \$2,700, plus 960 kw. a \$1.25, or \$1,200. In other words, 30 per cent of his bill would be a payment for a privilege, and not for current used. And this privilege amounts roughly to about 60,000 kwhr. of po-

2. By automatic control equipment so designed as to partially diminish the current supplied to certain selected types of equipment whenever the total load approaches a set figure, the demand may be kept within that figure without interrupting production.

The chart (Fig. 1) illustrates the second principle admirably. Likewise

saving to the manufacturer of \$300 per month, or at the rate of \$3,600 per year. And not only is this manufacturer saving money every month, but he has released an equivalent amount of energy to his neighbor down the street, who, in using it today, is helping to reduce unemployment.

Just what is it that such automatic control equipment does? It automatically trims the current furnished to various selected pieces of apparatus in the plant whenever the total load reaches a predetermined figure. These pieces of apparatus are selected for this current-trimming maneuver on the basis of their capacity to function as completely as necessary at less than full load during such peak periods. Electric heating equipment such as melting furnaces, heat-treating and annealing ovens, baking, enameling and japanning ovens, oil heaters and many similar loads are all ideal for load control purposes, since the current to them may be reduced or interrupted momentarily with little or no loss in temperature and no loss in production. There is sufficient heat storage in the walls of practically all heating equipment to carry over brief periods of current lessening, or even slight current interruptions. These are the primary sources of load control, due to their steady performance characteristics.

Secondarily, large motor-driven air or ammonia compressors may be unloaded for brief periods without stopping the motors, and with little loss in pressure. Large pumps may be throttled. Machines connected to motors through magnetic or pneumatic clutches may be de-clutched without stopping the motors.

Finally, and as a last resort, an entire circuit may be temporarily disconnected, stopping a machine or a group of machines until the total load has dropped sufficiently to provide the necessary margin within the predetermined demand setting to enable operation again. Careful analysis will determine the proper figure at which the control equipment may be set so that disturbances to production, if any, may be short, and not pronounced. Each individual situation must be considered on its own merits.

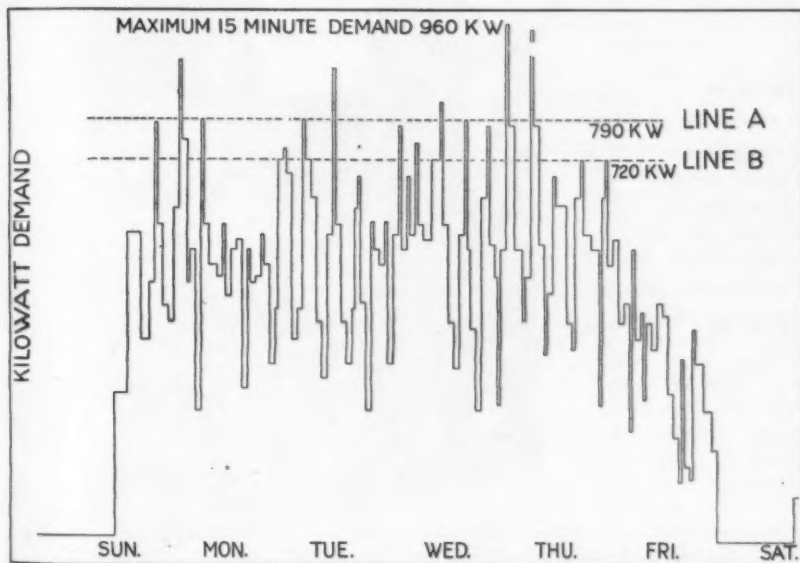


Fig. 1—Totalizing chart record of electrical demand in a Pennsylvania industrial plant.

tential output held dormant at his command.

Both the manufacturer and the central station are losers: the manufacturer because almost a third of his electrical bill is for power he did not use; and the central station because it could get twice as much revenue for the capacity it has held in reserve, if it could be freed and turned into actual output.

There are two methods whereby the high peaks of the above considered demand may be leveled off:

1. By carefully scheduling the operation of the intermittently used equipment in the plant, their current demands may be made to come at the low-load periods of the normally operated apparatus. This method, while possible, and in vogue in a few small, expertly managed plants, is extremely difficult to put into effect in the average large plant. It requires the greatest care and the closest supervision of schedules. Further the least slip-up may allow most of the good effects to be lost at any time.

it continues the example under discussion. The maximum 15-min. demand in a given week in an actual industrial plant in Pennsylvania was 960 kw. Five times only during that week did the demand exceed 790 kw., and only 13 times did the demand exceed 720 kw. This totalizing chart record was a fair average of the week-by-week demand conditions of the plant.

Automatic control equipment was installed and set first to cut off any excess of power above the line A, or 790 kw. In several weeks of successful operation without the least let-down in production, observation and planning made possible a few minor changes in schedules that permitted a resetting of the control figure at line B, or 720 kw. Again, the production was not affected, but a total drop in demand had been gained of 960 to 720 or 240 kw. At a demand rate of \$1.25 per kw. this meant a

There may be cases where corrections are not feasible. Experience has shown that such cases are few and far between. In a very large number of instances, demand figures have been decreased by upward of one-third their former proportions without any disturbance to production schedules.

It is, of course, common practice from the safety standpoint to use circuit breakers to trip the current supply when a load gets too big. Complete interruption ensues, necessitating, in most instances, manual re-starting. The main differences between automatic load control and the circuit breaker are these: Automatic control operates on a kilowatt basis (like a meter), takes into account high voltage, which sometimes causes increased demand of itself, takes off only selected portions of the load as required, and when the peak is over automatically restores them. The circuit breaker operates on an ampere (current) basis, trips out the particular portion of the load that is causing the peak, does not gage the duration of the peak and does not restore the load when the peak is past.

Various types of automatic electric control equipment are available to meet the different load conditions of varying industrial operations. The essential principle involved, however, is to limit the load absorbed in a plant to a set figure by "trimming" or even temporarily disconnecting the current supply to certain equipment during heavy load periods, and of restoring the full current supply when the peak condition has passed. An illustration of a typical control cabinet is given herewith (Fig. 2).

With regard to installations of such equipment, the National Paper Products Co. reports a saving of \$3,375 per year in lessened demand, the Kennedy Valve Mfg. Co. a saving of \$2,900 per year, General Motors Corp., about \$2,100 per year, Crucible Steel Co. of America for one of three installations a saving of \$3,600 per year, and Lycoming Mfg. Co. a saving of \$2,400 per year. Simonds Saw & Steel Co. says the "savings are very great, and operation of two electric melting furnaces are much more satisfactory."

Low Power Factor

Volumes have been written on the evils of low power factor without very much of a dent having been made in the annually growing tribute it exacts from industry. The reason, of course, lies in the relative cheapness, ease of starting, and general all-around fool-proof qualities of fine American induction motors. With low investment costs, with operation and maintenance minimized, induction motors have long been the favorite choice of manufacturers; and in 90 per cent of the cases the choice has been logical; for, like hard liquor, it is not the *use* but the *abuse* which causes difficulties.

The correction of low power factor may be tied in with any or all of these conditions:

1. Excessive loading of lines and equipment, necessitating either additional lines and equipment, or the establishment of high power factor to gain relief.
2. Excessive rates for power, due to the high cost of supplying existing current demands at low power factor.
3. Excessive variation in voltage, seriously affecting operation and resulting in losses from lowered output or in quality of output.

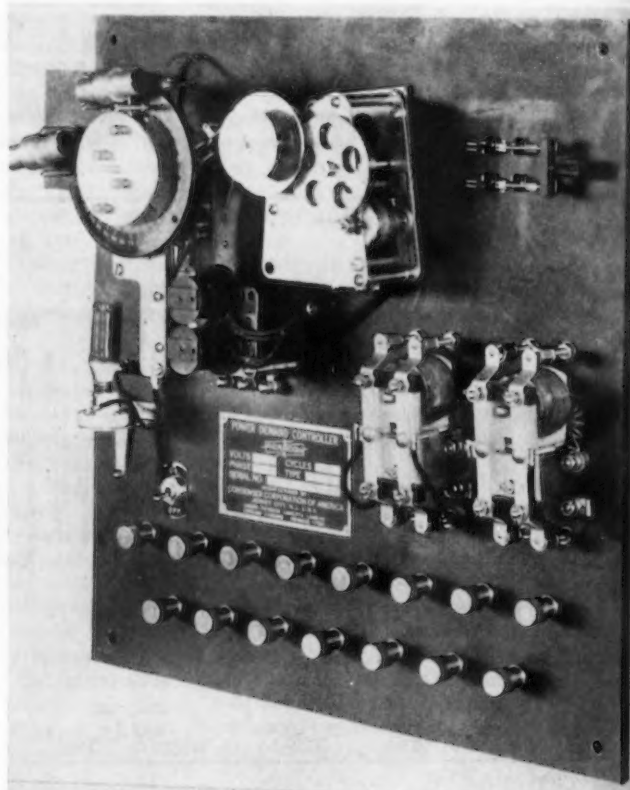
Most well-designed, well-made induction motors will operate at what is termed "good" power factor (that is 80 per cent or better) when at

than full load is the rule. Thus low power factor results. . . and is the subject of rate penalties.

Fortunately there is no case of low power factor operation that is not susceptible to correction, and almost always such corrective treatment yields excellent returns to the operator, either in power bill savings or in more power available, or both. For an excellent detailed treatment of the whole subject there is no better text available than Underhill's "Power Factor Waste." The high spots may be summarized as follows:

In practically all alternating current systems, due to the reactance to

Fig. 2—Typical automatic power demand control, to limit excessive peak loads in an industrial plant.



full rated load. It is under low load conditions that power factor becomes bad. This fact is made clear by the well-known Westinghouse chart shown herewith (Fig. 3). This chart is the composite of the curves of operation of a great number of induction motors actually tested. It shows a 20 per cent power factor under no load, 60 per cent under one-quarter load, and from three-quarters to full load practically uniform 85 per cent power factor. In fact, all induction apparatus has better power factor at full load than when underloaded.

This is the first and greatest fault of such equipment, for it is seldom possible to arrange to keep it operating continuously at full load. Generally other conditions make it seem wise to install induction equipment of a bit more capacity than is normally needed; as a consequence operation at one-half to three-quarter load rather

be found in the lines, transformers, induction motors and other equipment in the circuit, current lags behind the voltage. This reactance causes a reactive current to flow in addition to the active, or working current. In an induction motor, the active current magnetizes the working parts. It cannot be measured by a wattmeter for it does not produce energy. Nevertheless, it must be furnished by generator capacity in order to permit the active current (which does real work, and may be measured by a wattmeter) to function. The apparent power furnished is greater than the actual, or working power. The apparent power may be determined by multiplying together the readings of a voltmeter and an ammeter, and is measured in kilovolt-amperes. The actual power, measured by a wattmeter, is in kilowatts. The ratio of actual to apparent power is the power factor.

Since the reactive component is always at 90 deg. from the active component, the entire relation may be expressed graphically by means of a right triangle, as in Fig. 4. Assume a full load on a motor at a power factor of 85 per cent, amounting to 400 kw. To any convenient scale lay off the horizontal line *AB* as 400 units. From *A* draw the indefinite line *AC* to make the angle *BAC* whose cosine is 0.85 and from *B* erect the indefinite perpendicular *BC*.

Then the line *AC* is equivalent to the apparent power flowing in the system, or 471 kva., and the line *BC* is equivalent to the reactive component, or 248 rkva. Now, if the load is cut to one-half, since power current varies directly with the load, *DB* will be 200 kw. The reactive component will remain the same because it depends solely on the physical dimensions and intensity of the magnetic field of the motor. Consequently the apparent power at half load will be the line *DC*, equivalent to 318 kva., and the power factor is measured by the angle *BDC* or $\frac{200}{318}$ or 63 per cent.

Before considering the application of electrical corrective equipment to a low power factor situation, it is advisable to study the loads at which each piece of inductive apparatus is usually operated, to determine whether some purely mechanical changes may be made so that each motor may be worked under more nearly full load conditions.

For instance, the Plymouth Motor Car Co. made a careful study of 704 motors used in the miscellaneous small parts, crankshaft and axle departments, and found that many were oversized for the jobs on which they were being used. The net result of this study was a 48 per cent decrease in rating, effected by changing 278 motors to smaller sizes, cutting the total horsepower from 1710 to 878. The equivalent corrective capacity realized by these motor changes was 391 rkva., which resulted in a very great improvement in power factor. The motor investment account was decreased by some \$10,000, and the total cost of the changes involved was but \$3,000.

Use of Corrective Equipment

However, it is seldom that such a sweeping improvement can be made without the use of corrective equipment. At this point it is necessary to remark that the whole secret of correcting the low power factor of any electrical system lies in finding the best means of balancing the reactive component that is used in magnetizing the field of the induction motor. Since this reactive component adds to the current from the generator, it is necessary to introduce an element that will set up practically no reactive current while increasing the effective load, or that will actually balance re-

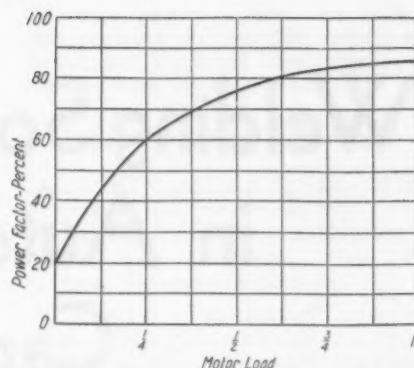


Fig. 3—Power factor curve of an induction motor, showing how power factor increases with underloading.

active current while not materially adding to the load; in either case making the average power factor of the system approach considerably closer to unity.

Synchronous motors may be used in place of, or with induction motors on the one hand, or condensers (rotary or static) may be used on the other. Synchronous motors are particularly applicable to low-speed, constant-speed drives requiring high torque, such as compressors, pumps, grinders, rolling mills, band saws, conveyors, large ventilating fans, mill line shafts, motor generator sets, etc., mainly in heavy duty applications of 50 hp. and over. Modern synchronous motors have been developed to supply practically any torque characteristics where the squirrel cage induction motor can be used. And the synchronous motor, in contradistinction to the induction motor, not only maintains high efficiency when operated at less than the rated load, but the power factor correction actually becomes greater. It can, in brief, be used as the producer of leading instead of lagging power factor.

Thus, when a synchronous motor is used at no load, but simply idles on the line, it is called a synchronous, or rotary condenser. Its function then is simply to furnish a leading component of sufficient value to largely neutralize the lagging component incident to the operation of induction apparatus.

In addition to such a rotary type of condenser, there are many varieties of static, or non-moving condensers (usually called capacitors) available for the same purpose. The function of

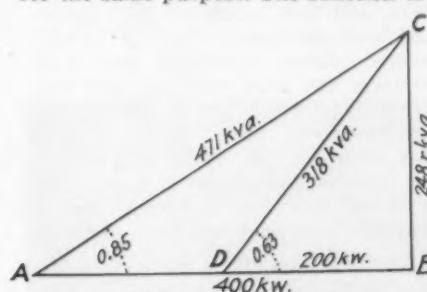


Fig. 4—Typical graphic representation of power factor triangle, showing increase of low power factor at half load.

any condenser, rotary or static, is that of making constantly available a capacity of leading component sufficient to keep the working parts of the system completely magnetized without drawing unduly on the current supplied by the generators.

No hard and fast rules may be laid down for the determination of the question of correcting low power factor. Individual circumstances will always have to be taken into account. First there should be a careful analysis of existing equipment and a study of the possibilities of improving operation by a readjustment of present loads and working schedules.

The Fairbanks Scale Co. used a capacitor installation to raise the power factor from 67 to 85 per cent, and secured net returns of \$2,890 per year. A somewhat larger installation of similar equipment raised a 70 per cent power factor to 90 per cent in the Indian Motorcycle Co. plant, enabling the company to take advantage of a better power rate at a saving of over \$9,000 per year.

The installation of stationary condenser equipment enabled the Synthane Corp., to earn a bonus for power factor over standard instead of paying a penalty for power factor below standard; thus effecting a net reduction of 24 per cent in the unit cost of purchased power. Even more to the point today is the experience of a St. Louis concern confronted with an increased kva. requirement and a possible shut-down due to power factor operation at 50 per cent. A condenser installation corrected the power factor to 95 per cent, released a 20 per cent additional motor load, and afforded substantial reductions in the power bills.

In a large wood-working plant in Ohio, producing its own power from the burning of refuse materials, many thousands of dollars had been expended for new machinery with individual motor drives. The new operating conditions imposed a very low power factor on the system, with the result that the generator heated up, voltage regulation became so bad that frequent stoppages in production occurred, and the management, in despair, considered the installation of another generator, duplicating the existing one. A synchronous condenser, floated on the line, however, improved the power factor from 58 to 97 per cent, and made possible the addition of an even greater load on the old generator, while the voltage regulation difficulties were completely cleared up.

In brief, the correction of low power factor, from the economic point of view, may mean lower investment charges on plant equipment, decreased power costs with increased machine efficiency, better voltage regulation with decreased production costs, and lower power rates, to say nothing of the possibility of securing more power to meet increased production demands.



Welding Society Meets in Automotive Capital

RECOLLECTIONS of the thirteenth Fall meeting of the American Welding Society, held at the Book-Cadillac Hotel, Detroit, Oct. 2-5, will surely include the extreme generosity of the program makers. Twenty-nine technical papers were presented. An afternoon was spent in visiting the welding departments of the Ford Motor and the Kelsey-Hayes Wheel companies, and throughout the convention the welding and other exhibits of the National Metals Exposition were open for inspection. Social events were not wanting; they included an industrial drama entitled "The Prosperity Process" and the society's annual banquet. Registration was much larger than at the 1932 Fall meeting.

The technical papers covered all types of welding—electric arc, resistance, gas and Thermit—and embraced the joining of a wide variety of materials, including cast steel, galvanized steel, nickel steel and various non-ferrous alloys. Furthermore the data presented concerned fundamental research problems as well as specific manufacturing procedures.

Investigates Strength of Welded Cast Steel

OUTSTANDING technical papers included one on the "Physical Properties of Welded Cast Steel," by C. H. Jennings, Westinghouse Research Laboratories, East Pittsburgh. To obtain the maximum efficiency in welded machinery and structures it is often desirable to incorporate in the design both rolled and cast steel parts. As very little work has been done on the problem of the strength of welded cast steel, an investigation was undertaken by the Westinghouse laboratories to determine the physical properties of butt and fillet welds made on cast steel. The tensile strength of fillet welds joining both cast steel to cast steel and cast steel to hot rolled low-carbon steel was investigated, and also the physical properties (tensile and fatigue) of butt welds made between both cast steel and cast steel and cast steel and hot-rolled low-carbon steel. The effect of welding on to a cast surface

was also studied. Duplicate tests were made with bare and fluxed electrodes.

The cast steel plates employed had the following analysis: Carbon, 0.28 per cent; manganese, 0.86; and silicon, 0.47 per cent. Physical properties were: Ultimate strength, 77,000 lb. per sq. in.; yield point, 42,500 lb.; elongation, 16 per cent in 2 in.; reduction of area, 32 per cent; and endurance limit, 26,000 lb. per sq. in.

Specimens included four plates 8 x 12 in. x 1 in. thick; two plates 12 x 12 in. x 3/4-in. thick, and 12 plates 12 x 12 in. x 1 in. thick with a 30 deg. bevel on two sides. The first two groups were cut into coupons and used to make fillet weld test specimens.

The hot-rolled low-carbon steel plates used to make some of the specimens had the following analysis: Carbon, 0.12 per cent; manganese, 0.50; sulphur, 0.02; and phosphorus, 0.02 per cent. The ultimate strength was 55,000 lb. per sq. in.; yield point, 30,000 lb.; elongation 38 per cent in 2 in.; reduction of area, 68 per cent; and endurance limit, 27,000 lb. per sq. in.

On all fillet weld specimens that contained cast steel bars the welds on one end were made so that either one or both legs were deposited on a cast surface. The welds on the opposite ends were deposited on machined or ground surfaces. This construction made it possible to determine whether or not any difference existed between fillet welds made on cast and machined surfaces.

The butt weld plates used for the static tests were welded and cut into bars, and then machined into tensile and bend specimens. Part of the butt welded plates contained cast kerf surfaces and part machined kerf surfaces. The welded plates used for the fatigue tests were machined into cantilever fatigue specimens. One of the butt-welded plates of this series contained cast kerf surfaces; the remainder had machined kerf surfaces.

Welding electrodes were 3/16 in. in diameter in all cases. Welding currents were 180 amp. for the bare electrodes, and about 190 amp. for the fluxed electrodes.

Results of the investigation were summarized as follows:

1.—Cast steel (of the composition used in this investigation) can be successfully arc welded to cast steel or hot-rolled low-carbon steel by means of bare and fluxed electrodes.

2.—Welding on cast surfaces is not harmful and the results obtained are approximately equal to those obtained from welds made on machined surfaces.

3.—Average tensile properties obtained from welds made on various combinations of cast and hot-rolled low-carbon steel are as follows:

Type of Joint	Bare Electrodes, Lb. per Sq. In.	Fluxed Electrodes, Lb. per Sq. In.
Fillet welds.....	64,300	75,000
Butt welds.....	63,000	73,600

4.—Ductility obtained from welds made on various combinations of cast steel to cast steel as obtained by the free-bend method is: Bare electrodes 8.0 per cent, fluxed electrodes 27.0 to 33 per cent.

5.—Fatigue strengths obtained from welds made on various combinations of cast and low-carbon steel are as follows:

Combination of Welded Plates	Bare Electrodes, Lb. per Sq. In.	Fluxed Electrodes, Lb. per Sq. In.
Cast steel to cast steel.....	15,800	.....
Cast steel to hot-rolled steel.....	14,000	23,200
Hot-rolled steel to hot-rolled steel..	16,000	25,000
Cast steel (parent metal).....	26,000	.....
Hot-rolled low-carbon steel (parent metal).....	27,000	.....

Foundryman Discusses Welding of Cast Steel

R. A. Bull, consultant on steel castings and formerly director of the Electric Steel Founders Research Group, stated that data of the kind reported by Mr. Jennings are needed for intelligent design.

The tensile properties of the steel castings used in the tests were said to be somewhat on the low side as compared with the value prescribed in the latest A.S.T.M. specifications (A154-33T).

The fact that Mr. Jennings obtained good welds with his cast plates was

emphasized as of particular interest from the standpoint of chemical composition. Some consumers are prejudiced against the use of steel containing as much as 0.28 per cent carbon and 0.47 per cent silicon to be joined by fusion welding by a procedure desired to develop high strength and good ductility. For some time many steel foundrymen have felt that there is no proper basis for requiring for welding readily machineable carbon steel, percentages of carbon, silicon and manganese considerably below the averages found in good castings manufacture. There seems to be no tenable argument against the claim that metal having relatively low percentages of carbon and silicon is weldable, with maximum economy, said Mr. Bull. But it is important to know where to draw the line.

Mr. Bull pointed out that Mr. Jennings performed a helpful service in using cast material that has a somewhat higher combination of carbon and silicon and manganese than is customarily found in the regular grade carbon cast steel. The good results obtained in the Westinghouse laboratories should tend to discount the theory held by some persons that soft carbon steel to be welded should have a carbon percentage close to 0.20 and a silicon percentage of about 0.03, he said.

Need Alloy Cast Steel Welding Data

In commenting upon the fabrication of machine and other structures by joining rolled steel to cast steel, Mr. Bull pointed out that the interest of the progressive steel foundryman is not confined solely to carbon steel. Many varieties of what are called low-alloy steels are now made in the foundry. At present there are no less than 60 such grades, besides a fairly large number of high-alloy steels. The alloy steel foundryman is trying to find out what he can regularly expect from weld metal that can be used to join the more popular grades of alloy cast steel with rolled steel of similar composition.

The steel foundryman is also interested, said Mr. Bull, in getting good results from alloyed weld metal in "repairing" slightly defective steel castings. Usually the defects considered weldable are confined to the less important members and are shallow blemishes that would not influence the serviceability of the casting. However, the conscientious steel foundryman, even in the case of the shallowest weldable defects, greatly prefers that the new metal have characteristics comparable with those of casting proper. For all of these reasons steel foundrymen will appreciate cooperation along these lines, extended by welding engineers, stated Mr. Bull.

The feasibility of joining cast steel and rolled steel parts by welding was emphasized by others discussing Mr.

Jennings' paper; in fact, the discussion revealed that several large companies are regularly employing such combinations of welded parts.

Impact Values of Weld Metal

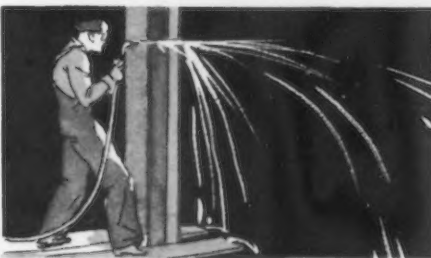
ANOTHER outstanding paper of the convention was that by J. C. Hodge, chief metallurgist, Babcock & Wilcox Co., Barberton, Ohio, on "Impact Values of Weld Metal."

The basis of mechanical specifications covering the material of a structure or machine is generally the static tensile test, in spite of the general recognition that the properties of tenacity and ductility evaluated by that test can only form a part of the necessary design information to assure satisfaction of the structure or machine in service, said Mr. Hodge. The associated property of toughness and lack of toughness, that is, brittleness, is in general disregarded under the assumption that sufficiently ductile materials are also sufficiently tough.

This viewpoint is justified, he said, for those materials in which such a correlation has been proven, but is open to question where new materials are introduced into engineering structures or where standard materials are subjected to new service conditions, such as the operation of process equipment at low temperatures.

Mr. Hodge discussed the impact test and its meaning. The property of toughness or brittleness is related to the properties of hardness, tenacity and ductility, particularly the latter, he said. We should expect to find great toughness associated with high ductility and low hardness and an extremely brittle condition associated with great hardness and low ductility. The relationships between these properties are only generally found; and the fact that exceptions are quite common may be proved by examination of the properties of plain carbon steel throughout a range of temperature.

From a table showing the effect of temperature on the tensile strength and impact properties of 0.21 per cent carbon steel (boiler plate containing 0.45 Mn., 0.02 Si.) it was to be seen that the effect of temperature upon the impact value of the steel is disproportionate to the effect of temperature upon the static tensile properties of the steel.



In discussing the notched impact values of weld metals, Mr. Hodge stated, that they may be considered as a measure of the ability of a metal to resist the development and spread of a fracture, due to the application of a single large stress concentrated over a small area.

Weld metals are essentially low-carbon steels, but their toughness or brittleness cannot be predicted from the general behavior of standard low-carbon steels. This is due to the extremely abnormal conditions of melting temperatures, casting and heat treatment under which the weld metals are produced and structure peculiar to those conditions which differ entirely from normal melting, thermal and mechanical treatments of commercial steels. It is also apparent that the toughness of a weld metal will be largely dependent upon the special process of arc welding employed and the variables attendant on any form of arc welding.

All notched impact values of weld metals in Mr. Hodge's paper were obtained from multipled-bead welds on plate thickness of 1 in. and over. The difference in the impact resistance of single-bead weld metal, possessing coarse columnar structure, and that of multiple-layer weld metal is of the order of 6 ft.-lb. for the single-bead metal and 33 ft.-lb. for the multiple-layer weld metal. These values are from metal arc welds deposited from hydrogen protected arc.

In discussing the notched impact values of the affected zone of the parent metal, tabular data presented indicated that excellent impact properties prevail throughout all zones of a weld and that the presence of coarse sorbitic structures does not reduce the impact values of the affected zone. The paper also includes discussion of impact values of weld metals at high temperatures and the effect of heat treatment upon the impact resistance of weld metals.

As to the relationship of notched impact values to engineering design, it was said to be somewhat difficult to interpret these values of a material from the viewpoint of the service condition of the material in a structure or machine. It is certain, said Mr. Hodge, that the notched impact value should only be considered along with the other static and dynamic properties of a material. If we accept the interpretation of the notched impact value as described in the early part of this paper, namely as the resistance of a metal to the spread of a fracture, the values thus obtained are of obvious importance.

In closing, Mr. Hodge emphasized that the impact values presented in his paper represent only those of weld metal made and deposited under the conditions described. They apply only to low carbon weld metals joining carbon steels within the range

of carbon content of 0.15 to 0.35 per cent.

Arc Welding of Galvanized Steel

RESULTS of two independent studies of the metal arc welding of galvanized structural members such as enter into naval ship construction were outlined by L. C. Bibber, senior welding engineer, Bureau of Construction and Repair, Navy Department, Washington.

In this experimental work the thinnest member used was $\frac{1}{8}$ -in. thick. The problem was to determine the effect of the welding on the galvanizing; the effect of the galvanizing on the weld; and the physiological effect of the zinc fumes on the health of the welders. Mr. Bibber's paper dealt with the first two problems only.

From a summary of results it appears that the effect of the welding on the galvanizing can be considered negligible, and the effect of the galvanizing on the welding is of little practical importance. The real problem in the welding of galvanized steel was said to be protection of the health of the welders.

In these investigations beads were deposited on a series of galvanized plates from $\frac{1}{8}$ to $\frac{1}{2}$ -in. in thickness by bare and covered electrodes to determine the thickness at which the galvanizing burned off the back of the plate as well as the front.

Another series of galvanized plates had galvanized flat bars joined to them by various sizes of bare and covered electrode fillet welds. These welds simulated the attachment of transverse frames and bulkheads to shell and deck plates. In order to determine the effect of bad fitting the bars were held away from the plates so that under the salt spray the salt atmosphere could get in between the plate and the bar and show what, if any, corrosion was taking place. The welds varied in size from $\frac{3}{16}$ to $\frac{5}{8}$ in.

A series of lap joint specimens was also made on plate varying in thickness from $\frac{1}{4}$ to $\frac{1}{2}$ in. with single and double layer welds deposited with bare wire.

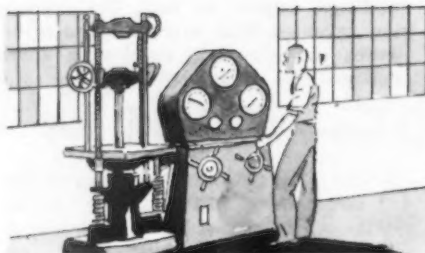
Hot Dip Galvanized Plates Employed

The plates used in this investigation were of medium steel. All galvanizing was done by the hot dip process. Navy specifications require that the coating shall not weigh less than 2 oz. nor more than $2\frac{3}{8}$ oz. per sq. ft., but the thickness of the coatings was greater than this. The specification required that the zinc be 98 per cent pure.

Results of the investigations were summarized by Mr. Bibber as follows:

1—In plates $\frac{1}{2}$ -in. thick and thicker, normal welding on one side will not burn off the galvanizing on the other side.

2—The corrosion resistance of



plates from which the galvanizing has been apparently burned off by the heat of welding, does not seem to have been lessened in any great degree.

3—The zinc coating is completely burned off only along a very narrow zone at the toe of the weld; the zinc is melted at a considerable distance from the weld, but the protection of this melted zone is not impaired.

4—Covered electrodes burn off the zinc to a greater extent and to a greater distance from the weld than do bare electrodes, but only to a small degree.

5—Multiple-bead welds burn off the zinc to a greater extent than do single bead welds, but only to a small degree.

6—Galvanizing increases the porosity of the single bead deposits somewhat, but not to as great a degree as might be expected. The increase in porosity is negligible in multiple-bead welds.

7—Galvanizing decreases the strength of single-bead deposits a small amount; the strength of multiple-bead deposits seems to be little harmed.

8—There seems to be little difference in the corrosion resistance of bare and covered electrode welds.

9—Small single-bead fillets seem to have practically as much resistance to corrosion as the original galvanized plate. Large multiple-bead welds, however, are attacked readily.

Welding of Structural Nickel Steel

WELDING of structural nickel steel was discussed in a paper by W. L. Warner, Watertown Arsenal, Watertown, Mass.

The structural nickel plate used at the Watertown Arsenal for building ordnance structures falls approximately in the class designated by S.A.E. 2335. Samples of plate from the welding shop show a nickel content between 3.3 and 3.6 per cent, with carbon between from 0.30 and 0.45 per cent. The tensile strength ranges from 95,000-105,000 lb. per sq. in.; proportional limit from 50,000-55,000 lb. per sq. in.; elongation in 2 in. is 20 per cent; elongation in 1 in. is 30-35 per cent; and reduction of area is 35 per cent.

Welding of this plate was said to present no great difficulty so far as applying the weld metal is concerned.

From observation of the arc action and the external appearance of a weld made with commercial low-carbon electrodes, one would be unable to judge definitely as to whether the base metal was structural carbon steel or nickel steel plate, said Mr. Warner. It is only when comparisons of weld metal densities, microstructure and physical properties are made that the differences become apparent.

Ordnance structures are designed to produce maximum strength and resistance to shock with a minimum weight. The majority of welds are of fillet type, and most of the plate used is $\frac{1}{4}$ -in. and under in thickness. For determining the strength of welded joints and the relative effects of details of welding procedure, both tensile tests and impact tensile tests are used for butt and fillet welds. X-ray examination is employed as a standard part of weld inspection procedure. All test welds are examined by this method for correlation and interpretation purposes; this procedure eliminates waste of time and money for machining and testing welds which are internally defective; it also permits accurate checking of the correct welding procedure before testing the welds to destruction.

Butt and fillet weld test specimens used for tensile and impact tensile tests were described and illustrated by Mr. Warner. A chart comparing the strengths of butt welds made with bare and covered low-carbon electrodes on $\frac{1}{4}$ -in. structural nickel steel plate showed that the effect of stress relieving at 600 deg. C. was to nearly double the impact values although not affecting the tensile strength appreciably.

The usual practice at the Arsenal for butt welds is to bevel thicknesses of $\frac{1}{4}$ in. and over at about $37\frac{1}{2}$ deg., with a slight shoulder at the bottom, between $\frac{1}{32}$ and $\frac{1}{16}$ in. On thicknesses of $\frac{1}{4}$ -in. and under, a $\frac{1}{8}$ -in. bare low-carbon electrode with 110-120 amp. is used. From $\frac{1}{4}$ to $\frac{1}{2}$ in. inclusive, a $\frac{5}{32}$ -in. electrode may be used with a maximum of 150 amp.

It was stated that structural nickel plate butt welds generally show a more porous condition with the bare electrode than similar welds on structural carbon steel, this characteristic becoming more pronounced as the amperage is increased above the limits given. With the bare electrode, the porosity of the weld metal on nickel steel plate is also sensitive to arc length and rate of travel. A very short arc, 15 or 16 volts, will produce a porous metal, even though the current is proper for the size of electrode being used. An arc of 18 to 20 volts gives best results as to soundness and physical properties.

Weld metal deposited from a covered electrode on structural nickel plate does not show the same sensitivity to current, arc voltage or speed of travel as with the bare electrode. The

welder can produce sound welds under any suitable welding condition where he can handle the electrode properly. On structural work the manipulation of present types of commercial covered electrodes was said to be very exacting and costly because of the heavy slag involved.

On structural carbon steel plate the covered low-carbon electrode produces a tensile strength of 60,000-65,000 lb. per sq. in., whereas the same electrode on $\frac{1}{4}$ -in. structural nickel plate develops 95,000-100,000 lb. per sq. in. This difference appears to be due primarily to the absorption of nickel from the plate metal melted when the weld is made. As the thickness of the plate increases, however, the situation changes. The ratio of the volume of plate metal melted to the volume of metal deposited from the electrode decreases per unit of weld, so that the alloy content of the weld metal is considerably below that of the plate and the strength of the weld per unit of cross sectional area is lowered as a result.

When welding structural nickel steel plate, the heat of welding produces a greater effect on the parent metal in a narrow zone adjacent to the weld than when welding structural carbon steel, because of the higher carbon content and the presence of nickel.

Stress Relieving Indispensable

Stress relieving treatment at 600 deg. C. (1112 deg. F.) was emphasized as indispensable for welded structures of nickel steel plate. It not only doubles the impact resistance of the weld, but reduces the hardness of the heat affected zone adjacent to the weld. This is quite essential where the plate adjacent to the weld is to be machined. The stress relieving treatment was said also to remove about 90 per cent of the stresses set up by welding.

It was stated that for structural work a general-purpose covered electrode should be developed which would give complete protection to the metal passing through the arc and leave no slag on the surface of the deposited metal. The arcing characteristics should be similar to those of the bare electrode so that it could be handled in any position similarly. It was stated also that a suitable alloy steel electrode is needed for welding heavy structural nickel steel plate to produce sound ductile welds of high strength.

Weldability and Other Properties of Inconel

THE weldability, strength, ductility and other characteristics of the new alloy Inconel were outlined in a paper by F. G. Flocke, J. G. Schoener and R. J. McKay, International Nickel Co., New York. The welding of this new alloy has been highly developed both through laboratory investigations and extensive field experience.

Inconel is fundamentally nickel to which sufficient chromium has been added to make it non-tarnishing in any form or finish, and since ferro-chromium is used in making this addition, some iron is present. The analysis is 80 per cent nickel, 14 per cent chromium and 6 per cent iron.

The alloy was originally intended for the dairy industry and has been used in the construction of holding and storage tanks, coolers and regenerators. It has also been adopted in the food and canning industries for steam jacketed kettles and cookers. The high strength and ductility, with high impact value, high modulus of elasticity and strength and resistance to oxidation at high temperatures have led to such widely separated uses as in nitriding boxes, airplane exhaust manifolds, screen wire, textile machinery and distilling equipment.

Inconel is available in the usual commercial forms as sheet, plate, strip rod, tube and pipe, both seamless and welded, forgings and special shapes. It can be joined by all commonly used methods of welding, including fusion and resistance. A flux-coated electrode has been developed to facilitate metallic arc welding.

For gas welding a flux is employed; it is the same recommended for gas welding of chromium bearing alloys. It is in the form of a thin paste, painted on the welding rod as well as on both sides of the sheets being welded. Used in conjunction with a slightly reducing flame, this flux is said to make for sound, ductile welds of good strength. Automatic gas welding is employed in the manufacture of small diameter Inconel tubing. Here, with temperature and atmosphere under accurate control, no flux is necessary.

Physical properties of the alloy in sheet form, annealed, were given as follows: Ultimate breaking strength, 80,000-95,000 lb. per sq. in.; elongation, 45-55 per cent; reduction of area, 65-75 per cent; and modulus of elasticity, 31,000,000.

Weld Strength Over 90,000 lb.

It was stated that tensile tests on butt weld joints of both $\frac{1}{16}$ and $\frac{1}{8}$ -in. thick sheets showed that electric arc welds were developing strengths in excess of 90,000 lb. per sq. in. These joints were not subjected to any heat treatment after welding. Elongation of the sheets is about 55 per cent at room temperature, and that of

the welded joints is about 35 per cent in 2 in. Inconel welds also withstand severe bending, either parallel or transverse to the direction of welding.

As to the weldable thickness range, it was said that No. 18 gage (0.050 in.) is about the lower limit which can be welded conveniently with the metallic arc without undue buckling of the sheet. With great care in clamping the sheets, and after some practice, lighter gages can be metallic arc welded. No lower limit need be set for gas welding, as this is dependent upon the ability of the welder. Use of jigs or clamps is recommended in arc welding not only light gage material, but material up to 5/32 in. as well.

The alloy may be ground readily and polished easily to the high finish required in food and dairy equipment. Ease of repair or re-welding is also a feature.

In discussing the corrosion resistance of welds it was stated that it has been found that any sound weld will resist corrosion as well as the Inconel sheet. Strain and recrystallization in the neighborhood of welds may affect the corrosion resistance. Analysis of test results shows Inconel to be relatively little subject to such effects. As to whether there may be precipitation of carbides during welding and resulting deterioration known as weld decay, it was stated that Inconel is not subject to the deleterious effects of carbide precipitation, and that precautions to prevent weld decay are unnecessary.

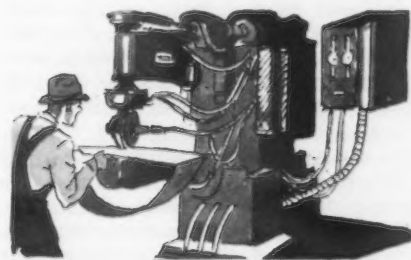
Recent Developments in Thermit Rail Welding

PROGRESS made in Thermit welding, particularly in street railway and other rail applications, was interestingly covered by J. H. Deppler, chief engineer and works manager, Metal & Thermit Corp., New York, in an address on "Modern Rail Welding Without Interrupting Traffic."

Much of the new construction welding of street railway rails that was naturally lost during the depression has been replaced by maintenance and repair welding. The latter has steadily grown in importance. Almost invariably it has had to be done without interrupting traffic, and although this restricts production slightly it has much less effect than first supposed.

Problems encountered in installing short lengths of rails in embedded track and the methods and equipment used in this type of rail maintenance were explained. The type of joint used is the center pour weld or the more recently developed cross-center pour weld. Cars are allowed to pass during the preheating and almost immediately after the weld is poured.

Some of the newer developments in welding of open track on steam railroad lines were also described by Mr. Deppler. The type of joint used in



this work is a combined pressure and fusion weld, in which the base and web of the rail are fusion welded and the heads are pressure welded.

The heat for the pressure weld is furnished by the alumina generated in the Thermit reaction, which, after the steel fills the mold to approximately the under side of the head, flows around the heads of the rails and in a few minutes brings them to a temperature at which they can be pressure welded. Application of this pressure requires heavy clamps.

Half a Mile of Rail Without Joints

An installation on the main line track of an Eastern railroad was illustrated. The tie plate used provides a shoulder on each side of the rail base, and this was said to be of great importance when open track is welded into long lengths. The type of pressure weld described was said to have been given a number of heavy service tests over a period of two or three years, some on main line track and others in freight classification yards. Even after this length of time the joints cannot be located by an examination of the top of the rail, but only by the excess metal in the web and base. The wear at the joints is no different from that of the rail section itself.

Being satisfied with the strength and shock resistance of such rail welds, and confident as to their wear resistance, it remained only to prove that the expansion due to temperature of such long lengths of open track would introduce no difficulty, said Mr. Deppler. It is expected that the installation pictured will fully confirm the findings of the State railways of Germany, namely that temperature change will cause tension and compression in the steel of a rail itself, but will otherwise cause no motion and that even where the rail is made continuous for 1000 ft. or more, expansion joints are not necessary but ordinary joints would do.

Of the particular installation illustrated, it was stated that it was at first planned to leave an open joint at the end of each five welded rail lengths; and in this way about 2690 ft. of both northbound and southbound track was welded. When one of these welded lengths was completed, an extremely hot day was encountered in which the rail temperature reached 156 F. It was naturally thought that this high temperature would close all the unwelded joints tightly; but when they were examined and found to be $\frac{1}{4}$ -in. open, which was the amount left at the time of welding, it was decided that it would be perfectly safe to weld these expansion joints and make the entire 2690 ft. continuous rail without joints.

In addition to eliminating battered and pounded rail ends, the welding was said to overcome a very serious trouble, namely creepage.

Use of the shielded carbon arc in Class 1 welding was outlined by E. W. P. Smith, consulting engineer, Lincoln Electric Co., Cleveland, at the opening session. In the process described, striking of the arc, feeding of the carbon electrode, autogenizer and filler strip, where needed, are automatically accomplished, and the arc length is maintained constant and the carbon electrode rotated so as to keep it symmetrically pointed. The weld metal deposited was said to be better than the parent metal, due to controlled atmosphere conditions, and to excel requirements of the A.S.M.E. code. The shielded carbon arc was said to give weld metal having ultimate strengths ranging from 65,000 to 76,000 lb. per sq. in. and elongation of 20 to 30 per cent in 2 in. of weld metal. It was stated that if the elongation is taken on the extreme fiber, as in outside bend test, it will be about 40 to 60 per cent. A high degree of corrosion resistance is also claimed.

Welds Made Under Water

EXPERIMENTAL work in underwater welding was described in a paper on "Electric Arc Welding Under Water," by N. S. Hibshman, C. D. Jensen and W. E. Harvey, Lehigh University, at the fundamental research session arranged by the American Bureau of Welding, the research division of the A.W.S. The investigation showed that should the occasion arise, electric arc welds of good quality may be made under water with commercially available electrodes.

A highly regarded paper at this session was that by S. C. Hollister, professor of structural engineering, Purdue University, on "Stress Distribution on Welded Connections." In this, a continuation of a paper presented at the last Fall meeting, the effect of localized stresses and the means of overcoming such stresses by suitable design, were discussed.

A session devoted to resistance welding featured the following four papers: "Automatic Controls for Electric Welding," by H. W. Roth, president, Control-Weld Corp., Detroit; "Timing of Spot Welders with Reference to Current Flow," by D. C. Wright, chief engineer, Electric Controller & Mfg. Co.; "Precision Spot Welding with Tube-Controlled Contactors," by C. Stansbury, engineer, Cutler-Hammer, Inc.; and "Controlled Welding," by O. C. Frederick, General Electric Co., Philadelphia. The latter included brief data on a new "Synchrotime" portable spot welder controller. Two schools of timers were represented at this session, namely, time-current and straight time.

At an earlier session, R. L. Briggs, research engineer, Thomson-Gibb Electric Welding Co., outlined the development of various control devices applied to resistance welders, and discussed their advantages and

disadvantages, as well as their fields of application. The title of his paper was: "Development of Resistance Welding Electric Power Control Devices."

Welding Small Everdur Tanks and Non-Ferrous Piping

Various methods of manufacturing copper and copper-alloy tanks ranging in capacity from 1 to 300 gal. were explained by Ira T. Hook, research engineer, American Brass Co., in a paper on "Small Welded Everdur Tanks." At the same session, D. E. Roberts, sales engineer, Linde Air Products Co., discussed at length the welding of commercial yellow brass pipe and other non-ferrous piping. Welding, it was held, permits reproducing in a pipe joint the same or greater strength and corrosion resistance of the base material. It utilizes the full wall thickness of the piping, and there need be no added weight.

"Welding in a Large Shipyard," was the title of an interesting address by G. H. Moore, Jr., Newport News Shipbuilding & Drydock Co. Confidence in welded joints has been gained by actual experience and welding and oxy-acetylene cutting have become a matter of every-day routine. Advantages include savings in weight as well as increased structural efficiency. A welding school is maintained, and it was said that good preparation and piece work have increased quantity as well as quality of weld metal deposited. During 1932, 140 metal arc welding operators were required at peak production, and 51 men were trained to do tack welding on sub-assembly work.

R. R. Kondal, Wickes Boiler Co., described a "Shop Set-up for Fabrication of Welded Machinery," and D. S. Lloyd, Dominion Oxygen Co., of Canada, spoke on "Welding as an Aid to the Modernization of Breweries." Control of quality of welding in an aircraft plant was set forth in a paper by T. H. Speller and P. N. Jansen, Curtiss Aeroplane & Motor Co.

Papers at the sixth and final session of the convention included: "Pressure Regulators and Regulation Problems," by G. M. Deming, Air Reduction Sales Co.; "The Oxy-Acetylene Process in the Automotive Industry," by G. B. Purcell; "Welding in the Automotive Industry," by C. A. Bowlus, Welding Sales & Engineering Co.; and "Building Up Pistons with Bronze," by T. W. Greene, Linde Air Products Co.

Attendance at the industrial drama: "The Prosperity Process" was estimated as in the neighborhood of 2000. This play, written by John P. Waters, Linde Air Products Co., and which was presented by the welding society in cooperation with the International Acetylene Association, follows the one presented by the acetylene association in Philadelphia, Nov. 17, 1932.

Steel Treaters Review Progress

A LARGE variety of subjects was embraced in the technical program of the American Society for Steel Treating at its annual Convention in Detroit, Oct. 2 to 6, during the National Metal Congress. At the nine technical sessions 30 papers were scheduled which covered the following range of topics: Critical temperatures and thermal expansion, decarburization, stainless steels, tool steel problems, gray iron heat treatment, bright annealing and other heat-treating problems, metallography, radiography and crystallography, age hardening, impact and creep test results, manufacture of steel, steel for cold heading and others. It is evident from this that the question of changing the name of the society to one more inclusive of its activities is uppermost and possibly warranted. While there is considerable sentiment in favor of a change, there is sharply divided opinion as to just what name to adopt and among some of the older

members decided opposition to any change. The attendance this year was fully equal to that at the Convention in Buffalo last year in October, and probably somewhat larger.

The technical feature of the week was the Campbell Memorial lecture delivered by H. J. French, research department, International Nickel Co., New York. His subject was "Fatigue and the Hardening of Metals." This important contribution to a vital problem is abstracted briefly on other pages. A very large attendance greeted the speaker who was introduced by Dr. A. B. Kinzel, Union Carbide & Carbon Research Laboratories, New York.

It is not possible in a limited technical report of this nature to include all the many worthy papers. The object here is to select a few of the more practical and less highly theoretical ones and to report their main features with some of the discussions.

his results obtained in 1913 and 1914, to which the author refers, were obtained with hydrogen which had been freed from oxygen by passing through red hot copper foil from CO, by passing through a phosphoric anhydride tower. The examination for evidences of decarburization was made only by means of the microscope. When it was observed that the outside surface of the specimen was still hyper-eutectoid after annealing in this purified hydrogen for six hours at 2130 deg. F., it was concluded that hydrogen was not a factor in the commercial decarburization of tool steel. No investigation was made to determine if there had been a minor amount of decarburization which still left this specimen with more than the eutectoid requirement of carbon. If the results of Mr. Austin's work are to be correctly interpreted, said Mr. Emmons, it is believed that they are in substantial agreement with his own limited experimental findings.

The point which Mr. Austin makes that there is a critical content of water vapor in hydrogen which exerts a minimum decarburizing action is very interesting, said Mr. Emmons. It may lead to increased refinements in the atmospheric control of furnaces for particular annealing operations.

Mr. Austin's paper has a definite bearing on a complex problem, said Dr. A. B. Kinzel, chief metallurgist, Union Carbide & Carbon Research Laboratories, New York. The degree of concentration of hydrogen is involved. Our work has shown, he said, that the lower the hydrogen concentration, the greater the decarburization. The next move is to get more quantitative data on mixtures of gases when the hydrogen concentration is lower and more flexible.

Decarburization of Steel by Hydrogen

It has generally been considered that hydrogen gas is a strong decarburizing agent for steel. Some bright finished steel manufacturers have recently reported success on annealing high-carbon steels in hydrogen-bearing gases and consider that such bright annealing in dissociated ammonia (which contains 75 per cent hydrogen) can be accomplished with little or no loss of carbon from the surface of the bar or sheet.

Light on this subject is contained in a paper by C. R. Austin, research laboratories, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., entitled "A Study of the Effect of Water Vapor on the Surface Decarburization of Steel by Hydrogen with Certain Developments in Gas Purification." The paper gives data obtained under experimental conditions more refined than hitherto and outlines the method adopted for the preparation of "pure hydrogen."

The author demonstrates by chemical and metallurgical analyses that the pure gas has a definite but extremely limited decarburizing power at 800 deg. C. on eutectoid steels, and that as the water vapor content of moist hydrogen gas is increased (except in very low concentration) the decarburizing power of the gas is also profoundly increased. In very low concentration (10 milligrams water vapor per cubic foot of hydro-

gen) the presence of water vapor appears to reduce further the limited decarburizing power of the dry gas. The observations recorded should have commercial value, says the author, in the application of "dry hydrogen" to bright annealing of high-carbon steels concomitant with freedom from surface decarburization.

Discussion

This paper elicited considerable discussion, both oral and written, which emphasized its importance. J. V. Emmons, metallurgist, Cleveland Twist Drill Co., Cleveland, said that

Problems of Quenching Steel Cylinders

DOES an increase in quenching temperature actually produce faster cooling as is apparently implied by the resultant deeper hardening? What is the ultimate limit of cooling rates attainable in steels by increasing the quenching power of quenching media? What is the sequence of transformations in shallow hardening steels? These and other questions, says Howard Scott, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., in a paper "Some Problems of Quenching Steel Cylinders," can be answered by a study of cooling rate

distribution during the quenching of a simple shape as affected by the important variables of quenching: Size of piece, kind of quenching medium, and quenching temperature.

There are seven factors of major importance which determine the cooling rate within steel cylinders during quenching, says the author. They are interrelated in a manner explicitly defined by the laws of heat conduction from which the general relations were calculated. These results are given in the paper in condensed tabular form from which the effect of each

variable on the cooling rate can be readily deduced. In order to apply these data to the solution of specific problems, the thermal constants of representative steels and of several important quenching media were evaluated approximately. The values obtained were used to show how the cooling rate at the center of a cylinder

and at a crucial temperature varies with the quenching medium and diameter of cylinder. Effects of the same variables on cooling rate distribution were also expressed as a contribution to the problem of quenching shallow hardening carbon steels. Several other questions on hardening of steel are amenable to study.

Life of Turning Tools

A COMPREHENSIVE abstract of the paper by O. W. Boston and W. W. Gilbert, of the University of Michigan, entitled "The Life of Turning Tools as Influenced by Shape," was published in *THE IRON AGE*, Sept. 28 and Oct. 5. There was some discussion of this paper which was, in part, as follows:

There is no doubt that Mr. Boston's work is outstanding, particularly from the point of correlating former data which we have available to the present marked trend toward alloy steels. This paper and the graphs presented probably mark the initiation of further extensive work in the field of correct cutting angles and basic formulae for the determination of the same, said L. F. Armstrong, president, Armstrong Bros. Tool Co., Chicago.

A clearer understanding of the factors that influence the cutting speed or tool life of high-speed lathe tools is afforded by Mr. Boston's interesting paper, said T. C. Digges, associate metallurgist, Bureau of Standards, Washington.

That our knowledge of machining

metals is steadily expanding through the unflagging efforts of Mr. Boston, his co-workers and other investigators, was the testimony of A. L. Davis, research engineer, Scoville Mfg. Co., Waterbury, Conn. The paper gives one cross section—the one which applies to turning forged steel, S.A.E. 2335 (C-O.36) in what may be called a semi-annealed condition. Several of the interesting conclusions of the authors are checked as correct by a very skilled lathe hand with whom the results were discussed. His choice of shape for a $\frac{3}{8}$ -in. tool bit for turning S.A.E. 1035 is as follows:

Nose radius— $1/16$ in.
Side angle of tool—15 deg.
Side rake of tool—22 deg.
Back rake of tool—little or none.
Clearance angles at side and end—6 or 7 deg.

In general, he said, have the nose radius and side angle as large as can be without causing chatter, and without getting excessive thrust of tool. For cutting soft machinery steel or brass, he would increase clearance angles from 6 or 7 to 12 to 18 deg., also side rake up to 30 deg.

Heat Treatment of Cast Iron

SOME criticism of the paper on "Heat Treatment of Cast Iron" by C. H. Morken, abstracted in *THE IRON AGE*, Sept. 28, was offered by two foundrymen.

H. Bornstein, chief metallurgist, Deere & Co., Moline, Ill., said that too much emphasis had been placed by the author on the melting medium rather than on the cast iron itself. His statement that electrically melted

gray iron had four times the strength of the old cast iron is an exaggeration. Cupola melted iron of today has tensile strengths from 25,000 to 40,000 lb. per sq. in. Cast iron, whether melted in the cupola, air furnace, or electric furnace, does not differ much as to composition and strength. And as to range of composition, the cupola is not restricted, Mr. Morken says, which is perhaps one of its drawbacks.

Gamma-Rays in Radiography

A CONTRIBUTION to the literature on the use of gamma-rays in the detection of defects in steel is found in a paper, "Sensitivity of the Gamma-Ray Method of Radiography," by John T. Norton and Alfred Ziegler of the department of mining and metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

It is often stated that, because of the very short wave-lengths of the

gamma-rays, the contrast in the resulting radiograph is less than when X-rays are used, and that this lack of contrast lessens the ability of the method to show up the smallest defects in the object examined. The aim of the authors' investigation was to examine in detail the sensitivity of the gamma-ray method over a considerable range of thicknesses.

In order to place this on a quantita-

tive basis, the sensitivity of the method has been defined as the change in thickness which is necessary to produce a definite change in film density under specified conditions. The sensitivity has been studied experimentally by radiographing blocks of iron of various thicknesses, using a capsule of radium as the source of the gamma-rays. The results show, say the authors, that when the sensitivity is expressed in a percentage of the thickness of the object it has a nearly constant value in the range from 2 in. to 6 in. which is in the neighborhood of 1.3 per cent.

Papers on Rustless Steels

TWO papers were delivered dealing with problems in the rustless steel industry, one dealing with stabilization of these alloys and another with the effect of certain gases at high temperatures.

Discussion

The authors have presented a fine contribution to the art of gamma-ray radiography, in the opinion of N. P. Goss, Cold Metal Process Co., Youngstown, Ohio. It is of great importance because they have made an attempt to work out a method which will detect small differences in thickness by obscuring the change in the blackening of an X-ray film under certain conditions. No one has ever approached the problem in this manner.

The conditions which must be fulfilled in order that accurate results may be expected have been pointed out, as well as the importance of internal scattering which takes place in the metallic structure to be X-rayed. Mr. Goss stated that he believed the gamma-ray should prove most useful in the field where the X-ray wave lengths are too long and cannot penetrate objects of considerable thickness—the gamma method would begin where the X-ray method ends.

Gases on Fe-Cr Alloys at High Temperatures

TWO members of the department of engineering research of the University of Michigan, Ann Arbor, Mich., R. L. Rickett and W. P. Wood, discussed "The Action of Oxygen and Hydrogen Sulphide Upon Iron-Chromium Alloys at High Temperatures" in a paper with that title. The principal object of this investigation was the determination of the mechanism of reaction.

The resistance of iron-chromium alloys to oxidation increases relatively slowly at first and then very rapidly as the chromium content of the alloys increases, when a point is reached where further additions have no effect. The alloys that were studied contained up to 28 per cent Cr. and

the temperature range covered was from 760 to 1095 deg. C. (1400 to 2000 deg. F.) with time of exposure up to 150 hr.

The authors found that, in general, hydrogen sulphide caused much greater scaling than oxygen under similar conditions and that increasing quantities of chromium greatly increased the resistance to oxidation but only slightly increased the resistance to attack by hydrogen sulphide under the conditions employed. A large increase in the

chromium in the scale was found to be a feature of the resistance to oxidation of the higher chromium alloys.

Alloys suitable for high-temperature use have become increasingly important of late years, say the authors. Their paper gives the results of an investigation to determine the nature of the action of corrosion gases upon heat resistant alloys; oxygen and hydrogen were selected because they are fairly typical of quite different corrosion agents.

Heat Treatment of Titanium as Stabilizers of Rustless Steels

SOME of the more important factors that have a bearing on the physical properties and corrosion resistance of rustless steel wire are discussed in a paper entitled "Some Factors Affecting the Physical Properties and Corrosion Resistance of 18-8 Cr-Ni Steel Wire" by two metallurgists of the Ludlum Steel Co., Dunkirk, N. Y., W. H. Wills and J. H. Findley. These factors are based on observations of material as processed through the wire mill and on laboratory tests. Methods of stabilizing the alloy consisted of heat treatment at 1500 deg. F. for various lengths of time and the addition of titanium.

Short time annealing for the higher carbon range (C 0.15 to 0.20) at 1500 deg. F. (up to 48 hr.) does not improve physicals and only slightly improves resistance to corrosion. Longer time at 1500 deg. F. (72 to 140 hr.), producing a structure with fairly large agglomerated carbides, does not improve physicals and somewhat improves resistance to attack after holding at the decomposition temperature of 1200 deg. F. In practice benefits from the long treatment would hardly be worth the extra cost.

Material from heats containing titanium in the as-rolled condition, also as-rolled and heated to the decomposition temperature, 1200 deg. F., was not changed as to physicals and showed much better resistance to attack than the 18 and 8. Very short time heating (1 hr.) of the latter at 1200 deg. F. has a decidedly detrimental effect on physicals and corrosion resistance, whereas with titanium content the effect is small in comparison. Holding the titanium material at 1500 deg. F. for periods of 90 hr. had very little effect on physicals and resistance to corrosion.

Of the two methods for stabilizing the 18-8 alloy—heat treatment at 1500 deg. F. and the use of a titanium addition—the latter is decidedly the more practical and efficient, say the authors.

* * *

THERE were some papers dealing with practical steel problems—steel manufacture and cold-heading steel. Three of these were briefly as follows:

Rimming Steel a "Natural" Steel

DIVIDING the large tonnages of steel as made today into two classes—"rimmed" and "killed" steels—William R. Fleming, metallurgist of the Andrews Steel Co., Newport, Ky., in his paper "On the Manufacture of Rimming Steel" says that this type of steel is really a "natural" steel, nothing being added to it in the ladle to seriously affect the natural physical characteristics of the molten metal—a steel resulting from the simplest process of manufacture.

The manufacture of this type of steel is today an art, not a science, says the author. The old method of trial and error in its making must be relied upon, for little is known of high temperature metallurgy and of the chemical reactions and relations of metal, furnace bottom, slag and

temperature. The author emphasizes the physical action of the molten metal in the ingot mold, claiming that it is there that the wide-awake and alert melter must find the answer to the efforts which he has put forth on the heat while in the furnace and ladle.

It is contended by Mr. Fleming that the character and type of rimming not only tells the story of what has gone before but it predicts accurately what the finished product will be. Then the real steel maker is the man who makes a careful study of the action in the molds of every heat he taps and is able to form a definite opinion between this action and the working of the heat in the furnace. The man who simply taps his heat and relieves himself of responsibility

as soon as the ladle is taken away is a melter and not a steel maker. Some typical chemical requirements of different companies are related by the author as well as the physical properties which make a steel particularly desirable for certain uses. There is much practical information in the paper.

Discussion

Due to the greatly increased application of rimming steel during recent years, the location and type of gas holes in the ingots have become of marked importance, said H. H. Ashdown, metallurgist, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. It is well known, he said, that these holes are largely the result of the dissolution and reaction of oxygen during solidification and that the extent of their presence is due largely to the finishing temperature in the furnace controlling the balance of FeO in the bath and slag. These two fundamentals control the final product, although this to some extent is also influenced by the speed of pouring and consequent rate of solidification.

The use and extent of a deoxidizer such as aluminum needs little comment on its effect on the quantity and to some extent the disposition of the gas holes in the ingots, continued Mr. Ashdown. The statement that the manufacture of rimming steel today is an art, not a science, and that this product still is the result of trial and error cannot be accepted. Such a declaration does not give the consumer much confidence in the product he is fabricating. The final stage of steel making should be in the ladle and not in the mold where, due to indiscriminate addition of aluminum, large quantities of aluminum oxide are enclosed in the steel, often with unfortunate results to the finished product.

Steel Solidification in Ingot Molds

ACCORDING to a paper, "Solidification of Steel in Ingot Molds," by L. H. Nelson, open-hearth metallurgist, Buffalo plant of the Republic Steel Corp., the chief factors influencing solidification in the order of their probable importance are:

1. Type: Shape and size of mold (cast iron in all cases).
2. Temperature of the steel above its melting point (amount of cooling necessary before solidification begins).
3. Analysis of the steel (due to difference in heat conductivity).
4. Temperature of the mold.

Determination of the influence of the mold itself on solidification or "freezing" was the chief aim of the paper. An electric furnace high-carbon steel was used and the pouring temperature (2250 to 2800 deg. F.) as it entered the ingot mold from the

ladle did not vary more than 50 deg. F. from heat to heat. The mold temperatures varied from 50 to 300 deg. F. All molds were big-end-up of the Gathmann type. The phases of solidification considered were:

1. Determination of the rate of solidification in various ingots.
2. Influence of mold design — size and shape on the rate of solidification.
3. Influence of mold design and the rate of solidification on the soundness and freedom from porosity of the ingots produced.

Discussion

The tests which Mr. Nelson describes confirm theories advanced by myself for some years, said Emil Gathmann, president, Gathmann Engineering Co., Baltimore, Md. These theories were proven to our satisfaction in laboratory tests made with specially designed big-end-up and big-end-down molds.

We have found, continued Mr. Gathmann, that increasing the thickness of

mold walls influences primarily the thickness of the secondary skin of the ingot rather than the cooling and solidification of the interior mass. The thickness of the mold walls has little or no effect on the cooling of the interior mass of large ingots, because soon after the initial thick skin of the ingot forms, an air gap forms between the mold and ingot. The rate of cooling immediately decreases and solidification proceeds, not by conduction of heat from ingot to mold but by the slower mechanism of convection.

It has also been our finding that rectangular ingots solidify more rapidly than square ingots and square ingots more rapidly than round ones. A suitable corrugated rectangular ingot solidifies more rapidly than any other type due to the greater area contacting the mold walls and also to the closer contact which is maintained between the mold and ingot at the primary faces of the ingot throughout the entire period of solidification.

Steel for Cold Heading

"BASIC Open-Hearth Carbon Steel for Cold Heading — Ingot to Wire," is the title of a paper by A. B. Arganbright, superintendent of inspection and tests, Wheeling Steel Corp., Portsmouth Works, Portsmouth, Ohio, which deals with carbon steel made by the basic open-hearth process for use in cold heading products ranging from 0.08 to 0.40 per cent carbon and 0.25 to 0.80 per cent manganese.

In the production of the ingots, the quality of the steel used is of prime importance and the better this material, the more care is needed in the making, he says. The modern automobiles have been made possible by the development of high-grade steels. The many bolts and cold-headed parts which go to make up the automobile play just as important a role as any other piece of steel in its assembly. Raw materials in the making of the steel are of prime importance both in the blast furnace and in the open-

hearth as well as cleanliness and consequently the refining and pouring operation along with proper adaptation of the molds to the grade of steel.

An accurate record is kept of the temperature of the ingots during rolling and they are subjected to numerous tests in order to judge their suitability for cold heading. Further careful examination is the rule before being prepared for wire drawing. Certain standard wire specifications, which are carefully followed, have been adopted by the manufacturers covering three types of wire—the Manufacturers' Standard Specifications adopted by the Association of American Steel Manufacturers. In the bundling room the wire is finally tested for grade as ordered, physical properties and surface imperfections. A complete history of the steel is then available which includes definite information on the manufacture and rolling processes and all routine tests.

Creep Test Results Compared

AN interesting contribution to the value of short-time creep tests of certain steels is contained in a paper "Comparison of Single-Step Long-Time Creep Results With Hatfield's Time-Yield Stress," by A. E. White and C. L. Clark, department of engineering research, University of Michigan, Ann Arbor, Mich.

There are 13 steels embraced in the study—5 of the plain carbon type, 2 of the 0.50 per cent molybdenum type, 4 of the 4 to 6 per cent chromium, a 4 to 6 chromium plus tungsten and a 4 to 6 chromium plus molybdenum type. Both open and killed

carbon steels were considered. The results include 3 steels at 850 deg. F. and 11 at 1000 deg. F. The data presented by the authors show whether or not one of the short-time methods advocated by certain metallurgists for determining creep characteristics of metal at elevated temperatures yields results comparable to those obtained from a carefully conducted long-time creep test. Tables and graphs are used to fully present the data.

While the time-yield method (Hatfield) does not yield results which are in exact agreement with those

from the long-time test, it does offer possibilities as a qualitative test for classifying a series of steels of a given type at any given temperature.

* * *

TOTAL registration of all participating societies in the National Metal Congress this year estimated at over 5000 as against 3500 a year ago in Buffalo.

* * *

ATTENDANCE at the Metal Exposition, held in Convention Hall, was much larger than a year ago and the space taken substantially exceeded last year's show. The exhibits this year were particularly attractive in their method of display.

* * *

THE Campbell Memorial Lecturer for 1934 will be H. V. Krivobok, professor of metallurgy, Carnegie Institute of Technology, Pittsburgh.

* * *

THE nomination for treasurer was refused by A. T. Clarage, president, Columbia Tool Steel Co., Chicago Heights, Ill., who is the present treasurer. As a result of this, Emil Gathmann, president, Gathmann Engineering Co., Baltimore, Md., was nominated at the annual meeting on Wednesday.

* * *

NEW names for the society, suggested by the board of directors, as announced at the annual meeting, are as follows:

AMERICAN METALS SOCIETY.
AMERICAN SOCIETY FOR METALS.

The entire membership will vote on this by letter ballot.

* * *

THE Howe gold medal, in memory of Henry M. Howe, was bestowed this year at the banquet on Joseph V. Emmons, chief metallurgist, Cleveland Twist Drill Co., Cleveland. It is awarded annually for the best paper presented at the convention the previous year. Mr. Emmons's paper was "Some Molybdenum High-Speed Steels," delivered at the Buffalo meeting in October, 1932.

* * *

AT the annual banquet on Thursday evening, Oct. 5, R. E. Zimmerman, assistant to the president of the United States Steel Corp., 71 Broadway, New York, was the principal speaker. In the next decade, said Mr. Zimmerman, unprecedented service to industrial users of metals and to users of finished metal products will be rendered by metallurgical research. Methods of analysis of the properties of metals, particularly of steel and its alloys, and the discovery of new alloys have developed so rapidly during the last few years that all industries using metal have come to consider the metallurgical laboratory as indispensable. The present findings of metallurgical research afford the foundation for progress in industry which was not dreamed of a few years ago and certainly forecasts our immediate future of improvement and expansion.

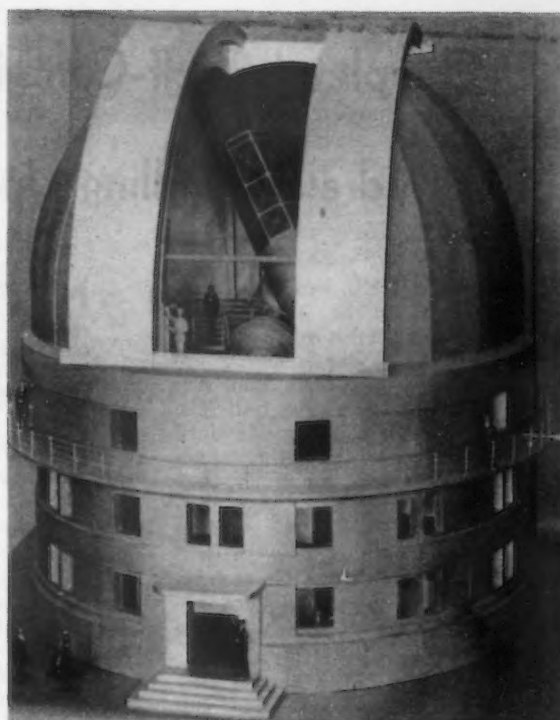
Warner & Swasey to Construct New Observatory

STEEL work of a highly specialized nature, optical parts requiring the utmost precision, an intricate system of anti-friction bearings and a complicated system of electrical control are features of the construction of a new observatory for which the Warner & Swasey Co., Cleveland, has the general contract. To be known as the McDonald Observatory and to be built for the University of Texas on Mount Locke in southwestern Texas, it will contain the second largest telescope in the world, with a mirror 80 in. in diameter.

Construction of the observatory will be of structural steel, with special alloy sheet metal covering on exterior and interior, including insulation. Cylindrical in shape and 71 ft. high, the structure will be surmounted by a 62-ft. dome. The entire structure will be built around two massive piers which will support the telescope. The piers alone will require 10 tons of reinforcing steel and 450 tons of concrete.

The many movable parts of the telescope and the observatory must be capable of immediate and easy adjustment in spite of their enormous weight. For example, the dome, weighing 115 tons, must be capable of

▲ ▲ ▲
MODEL of McDonald Observatory, University of Texas, showing reflecting telescope with its 80-in. mirror and 62-ft. revolving dome. The length of the tube is 26 ft., and the total weight of moving parts of the telescope is 45 tons.



revolving as desired. The result is a complicated system of anti-friction bearings and electric control whereby the entire operation can be handled by the observer by means of an electric push-button panel.

The Warner & Swasey Co. is widely known both as a builder of tele-

scopes and precision machine tools. Among telescopes it has constructed are the 36-in. Lick telescope in California, the 40-in. Yerkes telescope of the University of Chicago, the 72-in. reflecting telescope in Canada and the 69-in. Perkins telescope at Ohio Wesleyan University.

Pipe Welding Clamp

A PIPE welding clamp of simple design and adjustable for all sizes of pipe within the specified range has been announced by Oster-Williams, Cleveland. Designated as the Bull Dog, it is made in two sizes, with a range of 4 to 6 in. and 8 to 12 in., respectively. Other sizes will be available later.

One lever controls the action of the clamp, which may be easily put on and taken off the pipe. The two lengths of pipe to be welded are centered automatically and adjustable screw spacers keep them the correct

distance apart for efficient welding. The pipe is held very rigidly. Open construction of the clamp leaves a large amount of space for tacking. Welded steel construction is said to provide maximum strength with minimum weight. The 4 to 6-in. clamp weighs 18 lb. and the 8 to 12-in. tool, 26 lb.



Belt Sander for Wood and Other Materials

THE Porter-Cable Machine Co., Syracuse, N. Y., has brought out a type T hand belt sanding machine which follows closely the company's type B-10 dustless Take-About sander except that it has no dust-collecting system. The machine is designed for surfacing wood and other materials, either flat or curved.

Features include good balance, not only from right to left but from front to rear, accomplished by placing the 1/2-hp. universal driving motor in a horizontal position directly over the sanding shoe, thus concentrating the weight where the work is being done. Ease of operation, faster sanding and assurance of smooth, flat finish are attributed to the balanced construction.

Increased power and light weight, 15 lb., are other features emphasized. A standard 3 x 24-in. belt is employed. A rubber-covered rear pulley provides increased traction, and the new idler pulley arm made of drop forged duralumin resists bending and thus assures ease of belt tracking. Eight precision ball bearings sealed against oil leakage are employed. A hardened and ground worm and a worm gear made of nickel bronze are employed.

A new bench stand has been developed; with it the idler pulley can be used as a spindle sander for sanding exterior and interior curves, and also for burring small metal parts. The part of the bench stand that supports the rear of the machine is adjustable, and the table is adjustable up and down to utilize the entire width of the belt.



Completely Self-Contained Hydraulic Drilling Units

SELF-CONTAINED hydraulic feed units that can be arranged in groups to drill all holes in the various sides of a piece at one handling are being announced by the National Automatic Tool Co., Richmond, Ind. The design provides a compact standard unit that is flexible and interchangeable. Should the part for which they are arranged be altered or discontinued, it is only necessary to regroup the units and equip them with drill heads for the new work. No connections other than electrical are required. Six sizes of the unit are made.

The cylinder is bolted to the sliding head and moves back and forth with it. One motor drives both the drill-head and the hydraulic pressure pump. The drill-head is driven through a gear at the front of the mainshaft, which extends through the unit, and correct spindle speeds can be had by changing this gear and the gears in the drill-head. The holding bolt holes of the flanged front face of the unit are jig drilled, and in addition two bushed dowel holes are provided. The lower flange of the base is also provided with two bushed dowel pin holes, accurately bored and located, and holddown bolt holes are jig drilled.

Hydraulic pressure is supplied by a constant-volume vane-type rotary pump. The unit proper is used as an oil reservoir.

An independent control push-button station is provided for set-up and emergency operation; this permits the operator to control any head independently forward or reverse as desired. A centralized push-button station is provided on machines with two or more heads. This control station, which operates the traverse motion of all heads simultaneously, is used for routine operation. A transfer selector switch serves to transfer control to either the independent control station or the centralized control station as desired. Similar control is provided for the drive motors.

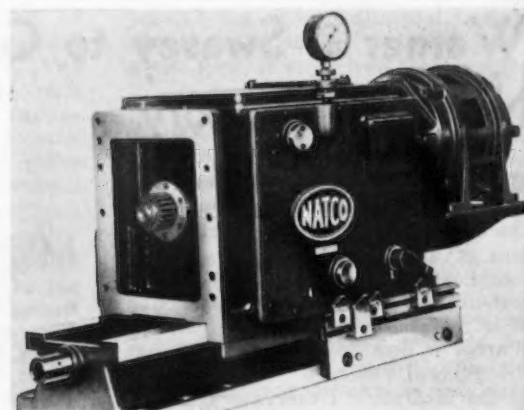
Units are arranged with a semi-automatic hydraulic feed, the operator starting the cycle by pressing a single push-button. A balanced valve of load-and-fire type, working in connection with trip dogs, controls the movements of the unit after the cycle is started. The lengths of rapid traverse and feed are adjusted by setting the valve trip dogs. Two independent feed control units provide adjustable rates of feed forward. Feed rate ad-

NO connections other than electrical are required. The units may be grouped to drill holes in all sides of the work at one handling.

justments are obtained by turning screws.

The units are flexible and may be used under a wide variety of conditions. They are furnished as standard with the following cycles: Rapid traverse forward, first feed, second feed, rapid traverse to the starting position and stop. A jump feed can also be furnished; this provides a second rapid traverse stroke, interrupting the feeding stroke and making the following cycle possible: Rapid traverse forward, feed forward, rapid traverse to starting position and stop; or, rapid traverse forward, first feed forward, rapid traverse forward, first feed forward, second feed forward, rapid reverse to the starting position and stop. A delayed reverse can also be furnished.

A feed governor prevents fluctua-



tion of the feeding rate due to variation of the drill thrust and prevents break through jump. This governor also maintains pressure in the hydraulic system equal only to the drilling requirements. A feed overload reverse is an adjustable means of limiting the maximum pressure in the hydraulic system. When the set pressure is reached the unit will reverse automatically even if the cycle has not been completed. This prevents use of dull tools and consequent loss of time in drilling.

For automatic machine applications a signal system can be supplied in connection with the feed overload reverse. Operation of the overload reverse causes a bell to ring and an indicator lamp to light. In addition a safety relay trips and the "forward" push-button becomes inoperative.

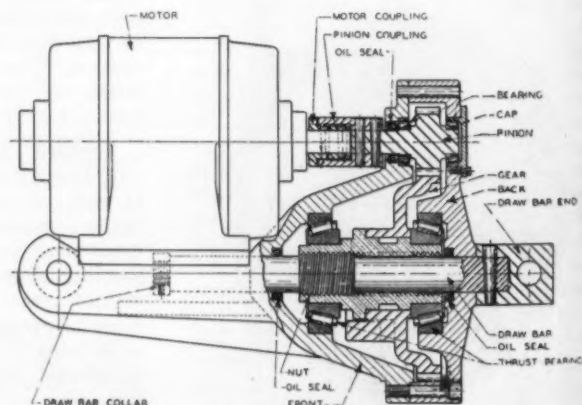
Power Unit for Operating Clamps and Other Machine Parts

A NON-ROTATING motor-driven power unit designed to carry a load under constant pressure in either direction for the entire length of the stroke has been brought out by the Cushman Chuck Co., Hartford, Conn. It is offered for operating vises, clamping fixtures, arbor presses, jacks, power clamps on

shears, and for application to welding, plastic molding and other machines. It can be used in horizontal, vertical or angular positions.

Arrangement of the device, named the Pull-Push Power Unit, may be seen in the accompanying sketch. The motor, of high-torque, inclosed ball-bearing type, transmits power to

PULL-PUSH power unit for operating clamping fixtures, vises, and other machine parts. It can be used in horizontal, vertical or angular positions.



a pinion through a coupling of unusual design. The pinion meshes with a gear that makes part of a revolution on the shank of a rotatable nut before it transmits power to the nut. Rotation of the nut on the threaded part of the drawbar causes the drawbar to move either backward or forward according to the direction in which the motor is running. The thrust of the drawbar in both directions is carried by Timken bearings.

An important feature is the hammer blow which assures instant release of the clamp or other device which the power unit is employed to operate. Before picking up the load the motor makes several free revolutions. There are abutments on the rotatable nut and on the gear and when these make contact the motor is in full speed. Thus the inertia effect of the rotor added to the

ft.-lb. torque is said to enable the abutment on the gear to deliver a powerful blow to the abutment on the nut, and instantly release the pressure on the gripped parts.

Total range of power is from 3000 to 35,000 lb. depending upon the size of unit. The loads, or power, can be increased considerably by gearing, levers or toggles attached to the machine on which the unit is employed. Base, clevis and flange type mountings are available, each with a drawbar movement of either 4 or 8 in.

Economy of power is attributed to the fact that the unit is self-locked during the machining cycle, the motor operating only during the forward and reverse travel of the screw. Low maintenance is attributed to the use of few parts and ample strength to withstand hard service.

Mask Protects Operators from Harmful Dusts

COMPLETE protection from harmful dusts, as in sand blasting, etc., regardless of density or length of exposure, is claimed for the Healthguard mask recently placed on the market by the Chicago Eye Shield Co., 2315 Warren Boulevard, Chicago.

This mask, designated as the style No. 601, is made with a soft molded rubber face-piece designed to adapt itself to any facial contour. When in position, the interior becomes sealed against outside air. The face-piece is held in place by a molded rubber head harness fitted with detachable and adjustable buckles, permitting the mask to be slipped quick-

ly on or off the head. Attached to the side of the face-piece is a flexible rubber tube, allowing free movement of the head. The lower end of the tube connects with the air filter which is attached in turn to an adjustable belt. A quick-acting coupling connects the filter to the air supply.

Air under pressure enters the filter and passes through a cartridge that removes foreign particles and odors. The clean air is then carried to the face-piece, the volume being regulated by an adjustable control valve. Excessive pressure in any part of the mask is avoided by the use of an automatic relief valve. It is stated that normal respiration is

permitted by constant circulation, assuring comfort, coolness and ample supply of dust-free air. Exhaled air is released through a channel by means of a one-one exhaust valve. When in position the face-piece of the mask is completely covered by an outer hood that is part of the standard equipment. The complete mask together with the hood weighs less than 50 oz.

Improved Turret-Head Metal Cutter

A NEW locking arrangement by means of which the turret may be locked conveniently in 10 positions at the front of the machine is an improved feature of the turret-head metal cutter or nibbler built in seven sizes by the Gray Machine Co., Box 596, Philadelphia. In these machines the turret turns for cutting various shapes in large sheets that will not turn through the throat. The new locking mechanism remains in a fixed position at the front, rather than rotating with the turret as formerly, which made it difficult to reach.

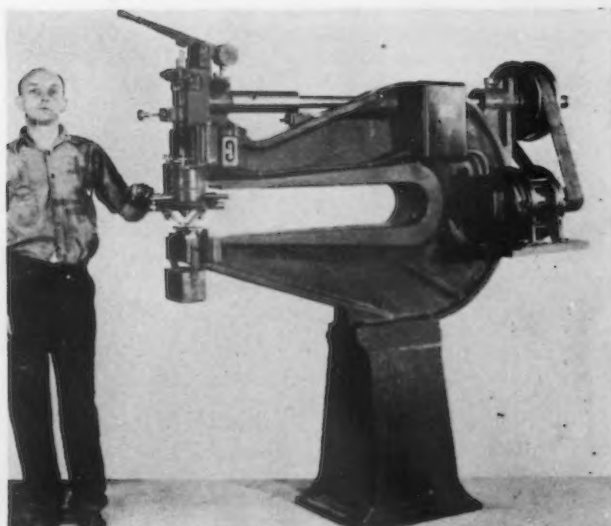
Another improvement is a two-speed telescoping flywheel which locks in two different positions on the drive shaft. In one position it operates the cutter at 550 r.p.m. For cutting light stock it can be slid rearwardly on the lineshaft, uncovering a smaller belt pulley in line with the motor that operates the cutter and driveshaft at 1200 r.p.m.

The 36-in. throat machine illustrated has capacity for cutting 3/16-in. mild steel at 30 ft. per min., cutting anywhere in sheets 6 ft. wide and of any length.

THE locking mechanism of the Gray metal cutter is now arranged to remain in a fixed position, where it is convenient to reach. There are 10 locking positions.

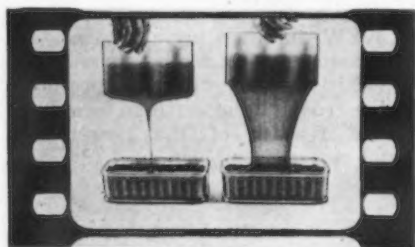


WHEN in position the face-piece of the Healthguard is covered by the outer hood shown above. Mask and hood weigh less than 50 oz.



Increased Film Strength Claimed for New Industrial Lubricants

INDUSTRIAL lubricants having unusually high film strength due to a special polymerization treatment have been announced by the research staff of E. F. Houghton & Co., 240 West Somerset Street, Philadelphia. Designated as the STA-PUT lubricants, these new products are made of pure mineral oil polymerized under



Reproduction of motion picture film comparing the film-forming properties of a straight mineral oil before and after the Houghton polymerization treatment.

carefully controlled heat and pressure, a treatment said to result in a complete rearrangement and closer bonding of the molecules of the oil without any change in its chemical content. It is stated that actual tests indicate a 40 to 65 per cent increase in film strength.

Three series of the lubricants are made, and grades are available for nearly every type of industrial equipment. The 300 series is liquid, ranging in consistency from light machine oils for high-speed spindles to heavy oils for slow moving bearings and extremely high loads. The 400 series is intended especially for gear lubrication, and several grades have been developed for all types of gears to meet any condition of speed and load. The 500 series, of grease consistency, is for screw-down grease cups, automatic grease lubrication systems, etc. They feed freely and will not separate, harden or turn rancid.

Cam Cutting Machine Built in Three Sizes

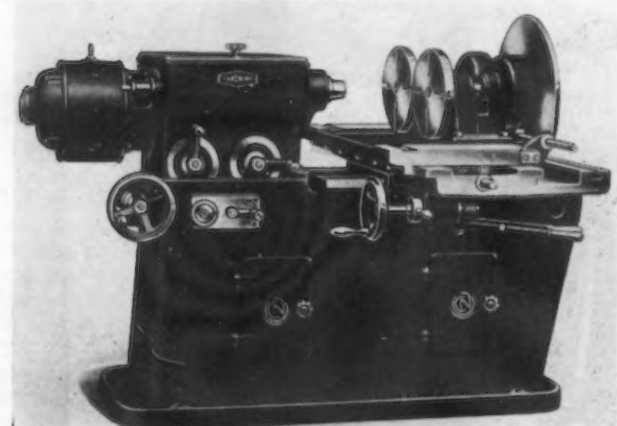
THREE sizes of the automatically-controlled cam cutting or milling machine here illustrated are being marketed by the Curd Nube Machine Co., of America, 117 West Lake Street, Chicago. The machine is designed for milling all kinds of cams, including drum or barrel types and those of irregular shape. The two largest sizes permit a 1 to 1 reproduction of cams up to 12 in. in diameter.

The smallest machine, the KF-O, is of bench type. It is for disk cams up to 7 in. in diameter and cylindrical cams up to 4 in. in diameter, 6 in. in length. The two largest machines, the KF-1 and KF-2, have one-piece cast beds designed to give maximum strength and rigidity for heavy cuts.

The KF-1 takes either a disk or barrel cams up to 11 in. in diameter and barrel cams up to 12 in. in length. The maximum stroke is 6 in. Patterns up to 21 in. can be accommodated and cutters up to 1 in. in diameter employed. The weight of the machine is 2860 lb.

The KF-2 cam cutting machine has a maximum disk capacity of 22 in., and barrel cams up to 12 in. in diameter, 12 in. long, can be handled. The maximum stroke is 7 in. Patterns up to 28 in. in diameter and cutters up to 1 in. in diameter can be used. The weight of this machine is 3410 lb.

Both machines will copy directly from a pattern or from an old or



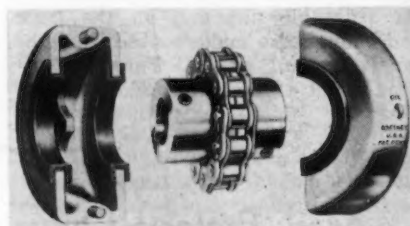
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ALL types of cams, including drum or barrel and cams of irregular shapes can be milled.



worn cam. The copying mechanism used is the same as that of the company's vertical-type K-3 machine. By using patterns larger than the work, accuracy of form and shape is said to be assured. The spindle is geared directly to the pattern.

Roller-Chain Flexible Coupling

AFLEXIBLE coupling consisting of two accurately-cut sprockets coupled with roller chain has been placed on the market by the Whitney Mfg. Co., Hartford, Conn. Proper clearance between the two sprockets



allows for slight shaft misalignment, and also gives a reasonable amount of motor end-float without binding or shaft distortion. The construction permits quick installation or dismantling of equipment.

A rotating-type coupling cover (patents pending) has been developed to give improved performance through proper lubrication and protection from dirt and grit. Of simple design, this cover is said to prolong the life of the coupling, assure safety, and improve the appearance of the machine on which the coupling is employed.

Offers Photoelectric Control Kit

THE Weston Electrical Instrument Corp., 614 Frelinghuysen Avenue, Newark, N. J., has brought out a Photronic control kit for engineers and others desiring to experiment with photoelectric control for mechanical equipment, operations, and for processes of various kinds. The kit contains all the equipment necessary for starting experiments, together with diagrams of connections. The equipment can be used as a smoke detector, burglar alarm, turbidity detector, door opener, counter for all classes of service, and safety device on machines.

The cell included in the kit is the Weston Photronic cell which transforms light energy directly into electrical energy and operates the Weston relays without the use of auxiliary apparatus or batteries. Its spectral response is said to be about the same as the human eye, so that it is extremely sensitive to color changes. "Photronic" is a registered trademark.

Railroad Freight Rates on Finished Steel Products

STEEL prices, as quoted under the regulations of the industry's code, must be delivered prices and must not be less than "the sum of the published base price for such product at the time of the sale and the all-rail published tariff freight charges from the basing point on which such base price is based to the place of delivery to the purchaser thereof." The appended table provides such freight rates from a number of basing points to representative consuming cities, as effective on Oct. 1, 1933, after the removal of the emergency surcharge. No attempt has been made to recognize combination rail and water rates, and certain commodities, including tubular goods, wire products and tin plate, are subject to variations from the published rates applying to finished steel products generally. It has been necessary in many instances to include rates from basing points other than the nearest on some products because certain cities are bases for only one or two commodities, while others cover the entire range of finished steel. All rates are subject to readjustment at any time.

BASING POINTS*						
	Pitts-	Coates-	Bethle-	Sparrows	Worces-	
To Maine	burgh	ville	hem	Point	ter	
Augusta	45	39	37	36	40	23.5
Bangor	47	41	39	38.5	41	27.5
Bath	44	38	36	35	38	22.5
Biddeford	42	36	34	33	37	20.0
Portland	43	37	34	33	37	20.5
To New Hampshire						
Berlin	43	37	36	34	33	25
Concord	40	34	32	30	35	16
Keene	38	32	29	27	33	13
Littleton	41	36	34	32	37	23
Manchester	40	34	31	29	34	14
Nashua	40	34	30	29	34	12
Portsmouth	41	36	32	31	35	17
To Vermont						
Barre	40	34	34	31	36	23
Montpelier	40	33	34	31	36	23
St. Albans	39	31	33	30	36	26
St. Johnsbury	41	35	34	32	37	23
To Massachusetts						
Boston	40	34	30	28.5	33	10
Fitchburg	39	32	29	28	33	10
Holyoke	38	31	26.5	24.5	30	12.5
Lowell	40	34	30	29	33	11.5
Lynn	41	35	30	29	34	13
Pittsfield	36	28	26	22	29	18.5
Springfield	38	31	26	24.5	29	12.5
Taunton	41	35	29	28	33	12.5
Watertown	40	34	32	29	34	10
Westfield	37	31	26	24	29	14
Winchendon	39	32	29	27	32	11
Worcester	39	33	28	26.5	31	..
To Rhode Island						
Newport	41	36	30	29	34	11
Pawtucket	40	34	28.5	27	32	..
Providence	40	35	28.5	27	32	11.5
Woonsocket	40	34	28	26.5	31	10
To Connecticut						
Ansonia	36	32	23.5	22	27	19
Bridgeport	36	32	22	20.5	25.5	20
Bristol	37	32	24	22.5	27.5	17.5
Hartford	37	32	24.5	23	28	15.5
Meriden	37	32	24	22.5	27.5	17

*For chart showing code basing points and products so based, see THE IRON AGE, Sept. 21, 1933, page 26-DD.

BASING POINTS						
	Pitts-	Coates-	Bethle-	Sparrows	Worces-	
To Connecticut	burgh	ville	hem	Point	ter	
Naugatuck	36	32	23.5	22	27	19
New Britain	37	32	24.5	23	28	16.5
New Haven	36	32	23	21.5	26.5	18
New London	38	34	25.5	24	29	15
Stamford	36	32	21.5	20	24.5	21
Torrington	37	30	24.5	22.5	28	19
To New York						
Albany	34	26.5	24.5	21.5	28	21.5
Amsterdam	34	24.5	26	22.5	29	22
Auburn	29	18	26.5	24	28	27
Batavia	25	10	29	27	30	31
Binghamton	28	21.5	22.5	19.5	26	26.5
Brooklyn	33	31	18	15.5	21.5	24
Buffalo	23.5	..	30	29	31	33
Corning	25	18.5	24.5	22.5	25.5	30
Dunkirk	21.5	10.5	30	29	31	34
Elmira	25.5	19	23.5	21.5	24.5	29
Geneva	27	16.5	26.5	24	27	28
Ithaca	27	19	25	22	26.5	29
Jamestown	20.5	13	30	29	30	36
Lockport	24.5	9	31	29	32	32
Long Island City	33	31	18	15.5	21.5	24
New York	33	31	18	15.5	21.5	24
Niagara Falls	24.5	8.5	32	29	32	33
North Tonawanda	23.5	6	30	29	31	33
Ogdensburg	35	25	33	30	35	29
Olean	22	13	27	26	28	34
Oneida	31	20.5	26.5	24	30	25
Oswego	30	19	28	25	31	28
Poughkeepsie	33	29	21.5	18	25	23
Schenectady	34	25.5	25	21.5	28	21
Seneca Falls	28	17.5	26.5	24	28	..
Syracuse	30	19	26.5	23.5	29	25.5
Troy	35	26.5	25	21.5	28	21.5
Utica	32	21.5	27	24	30	23.5
Warsaw .....	..	11	29	26.5	30	32
Watertown	33	22	30	27	33	28
Watervliet	35	26.5	25	21.5	28	21.5
Yonkers	33	31	18	18	21.5	23
To New Jersey						
Atlantic City	32	34	16.5	17.5	20	29
Bayonne	33	31	18	15.5	21.5	24
Bound Brook	31	30	15.5	11.5	19.5	24
Burlington	30	32	12	14	18	25.5
Camden	30	32	11	12.5	17	26.5
Elizabeth	33	31	18	13.5	21.5	24
Hackensack	33	31	18	15.5	21.5	24
Hoboken	33	31	18	15.5	21.5	24
Irvington	33	31	18	14	21.5	24
Kearny	33	31	18	14	21.5	24
Newark	33	31	18	14	21.5	24
New Brunswick	32	30	15	13	19.5	24
Passaic	33	31	18	14.5	21.5	24
Paterson	33	31	18	14.5	21.5	24
Perth Amboy	33	31	18	13.5	21.5	24
Phillipsburg	29	28	14.5	7	20	26
Trenton	30	31	12	12.5	18	25
To Pennsylvania						
Allentown	28	28	13.5	6	19.5	..
Amble .....	..	31	10.5	10.5	18	..
Ambridge	5.25	..	..	..	..	..
Ardmore .....	..	32	9.5	12.5	17	..
Arnot .....	..	21	26.5	24.5	27	..
Ashland .....	..	26.5	16	12.5	20.5	..
Athens .....	..	21	23	20.5	25	..
Avon .....	..	29	12	13	18	..
Bangor .....	..	28	16	9	21	..
Bath .....	..	28	14.5	7	20	..
Beaver Falls	6.5	..	..	..	..	..
Belleville .....	..	30.5	21	23.5	16.5	..
To Pennsylvania						
Berwick .....	..	..	..	..	25.5	19
Bethayers .....	..	..	..	..	31	12
Bethlehem	29	29	..	..	29	13.5
Birdsboro	27	29	..	..	29	9.5
Blawnox	3.75	..	..	..	..	..
Bloomsburg .....	..	..	..	..	25	18
Bradford	21	14	..	..	28	28
Bridgeport .....	..	..	..	..	31	10
Bristol	30	32	..	..	12	12
Buck Run .....	..	..	..	..	30	6.5
Burnham .....	..	..	..	..	26	18.5
Butler	8.5	..	..	..	..	..
Carbondale .....	..	..	..	..	24.5	20
Carlisle .....	..	..	..	..	28	15
Carnegie	3.75	..	..	..	..	..
Catasauqua	28	28	..	..	14	14
Catawissa .....	..	..	..	..	25	18
Chambersburg	24	30	..	..	17.5	17.5
Chester	29	32	..	..	9.5	9.5
Coatesville	27	30	..	..	..	..
Columbia	25.5	28	..	..	10.5	10.5
Conshohocken	29	31	..	..	9.5	9.5
Coplay .....	..	..	..	..	28	14.5
Corry .....	..	..	..	..	15.5	30
Crum Lynne .....	..	..	..	..	32	10.5
Danville .....	..	..	..	..	24.5	18.5
Darby .....	..	..	..	..	31	10.5
Downingtown .....	..	..	..	..	31	6.5
Du Bois	17	19.5	..	..	24.5	24.5
Duncannon .....	..	..	..	..	27	14.5
Easton	29	28	..	..	14.5	14.5
East Penn Jet .....	..	..	..	..	28	13.5
East Pittsburgh	4.5	..	..	..	..	..
East Stroudsburg .....	..	..	..	..	27	17.5
Eddystone	29	32	..	..	10	10
Elizabethtown .....	..	..	..	..	28	11.5
Elizabethville .....	..	..	..	..	26.5	17
Ellwood City	8	..	..	..	..	..
Emlenton .....	..	..	..	..	21	25.5
Ephrata .....	..	..	..	..	30	10.5
Erie	19	15	..	..	32	32
Franklin	16.5	19	..	..	28	28
Fullerton .....	..	..	..	..	28	14
Galeton .....	..	..	..	..	18.5	24
Girard	18.5	16.5	..	..	32	32
Greenville .....	..	..	..	..	19	30
Hamburg .....	..	..	..	..	28	12
Hanover .....	..	..	..	..	29	14
Harrisburg .....	..	..	..	..	27	13
Hatfield .....	..	..	..	..	30	11
Hazleton .....	..	..	..	..	26.5	16.5
Honesdale .....	..	..	..	..	26	21.5
Kennett Square .....	..	..	..	..	31	8
Kingston .....	..	..	..	..	25	19
Kutztown .....	..	..	..	..	29	12.5
Lancaster .....	..	..	..	..	29	9.5
Landisville .....	..	..	..	..	28	10
Lansdale	29	30	..	..	10	10
Lansdowne .....	..	..	..	..	32	10.5
Latrobe	8.5	..	..	..	..	..
Lattimer Mines .....	..	..	..	..	26.5	17.5
Lebanon .....	..	..	..	..	28	12
Leechburg	7.25	..	..	..	..	..
Lewistown .....	..	..	..	..	26.5	18
Lock Haven .....	..	..	..	..	21.5	21
Luzerne .....	..	..	..	..	24.5	19
Manheim .....	..	..	..	..	29	10.5
Marcus Hook .....	..	..	..	..	32	9.5
Meadville .....	..	..	..	..	18.5	30
Mechanicsburg .....	..	..	..	..	28	14.5
Mifflinburg .....	..	..	..	..	25	19
Millersburg .....	..	..	..	..	26	15.5
Muncy .....	..	..	..	..	23	19
Nanticoke .....	..	..	..	..	25	18.5
Nazareth .....	..	..	..	..	29	14.5
New Boston .....	..	..	..	..	27	14.5
New Castle	9.25	..	..	..	..	..
New Holland .....	..	..	..	..	29	8.5
New Kensington	5.25	..	..	..	..	..

ed Steel Products in Carloads (Usual Minimum, In C

		BASING POINTS						BASING POINTS						
Rows	Worces-	To Pennsylvania	Pitts-	Buffalo	Coates-	Bethle-	Sparrows	Worces-	To Pennsylvania	Pitts-	Buffalo	Coates-	Bethle-	Sparrows
nt	ter		burgh		ville	hem	Point	ter		burgh		ville	hem	Point
19		Berwick	25.5	19	17	21	..	..	Nicetown .....	..	31	10.5	12	16.5
16.5		Bethayers	31	12	12	17.5	..	..	Norristown	29	31	9	10.5	17.5
18		Bethlehem	29	29	13.5	..	19.5	..	Northampton .....	..	28	14.5	7	19.5
15		Birdsboro	27	29	9.5	11	18	..	North East .....	..	13.5	32	31	32
21		Blawnox	3.75	..	..	..	..	..	Oil City	17.5	18.5	28	29	29
19		Bloomsburg .....	..	25	18	15.5	20	..	Pennsburg .....	..	29	14	8.5	19.5
		Bradford	21	14	28	27	29	22	Philadelphia	29	31	10.5	12	15.5
		Bridgeport .....	..	31	10	10.5	17.5	..	Phoenixville	28	30	8.5	11	17.5
		Bristol	30	32	12	10.5	17.5	..	Pittston .....	..	24.5	19	15	22.5
		Buck Run .....	..	30	6.5	14	14.5	..	Plymouth .....	..	25	19	15.5	22
		Burnham .....	..	26	18.5	19.5	19	..	Pottstown	27	30	10	12	18
		Butler	8.5	..	..	..	..	..	Pottsville	26.5	27	13.5	12.5	19
		Carbondale .....	..	24.5	20	17.5	24	..	Reading	27	29	10	10	17.5
		Carlisle .....	..	28	15	17.5	16.5	..	Scranton	27	24.5	19.5	16	23
		Carnegie	3.75	..	..	..	..	..	Shafon .....	..	24.5	26.5	27	26
		Catasauqua	28	28	14	6.5	19.5	..	Shamokin .....	..	25.5	17.5	15	20
24		Catawissa .....	..	25	18	15	20	..	Sharon	12	20	30	31	30
33		Chambersburg	24	30	17.5	18.5	16	..	Shippensburg .....	..	29	17	18.5	17
30		Chester	29	32	9.5	13.5	14.5	..	Sunbury .....	..	24.5	17.5	17	19
34		Coatesville	27	30	..	13.5	15	..	Tamaqua .....	..	27	14	10	19.5
29		Columbia	25.5	28	10.5	14.5	13.5	..	Titusville	18	17.5	29	29	30
28		Conshohocken	29	31	9.5	11	17	..	Union City .....	..	16.5	30	30	31
29		Coplay .....	..	28	14.5	7	19.5	..	Vandergrift	8	..	..	..	..
36		Corry .....	..	15.5	30	29	31	..	Warren	20	15	28	28	29
32		Crum Lynne .....	..	32	10.5	13.5	15.5	..	Wayne .....	..	32	9.5	13.5	17
24		Danville .....	..	24.5	18.5	16.5	19.5	..	Waynesboro .....	..	30	18	19.5	14.5
24		Darby .....	..	31	10.5	12	15.5	..	Weatherly .....	..	27	16.5	11.5	21
33		Downingtown .....	..	31	6.5	13	16	..	West Chester .....	..	31	8.5	14	16
33		Du Bois	17	19.5	24.5	25	25.5	22	Wilkes-Barre	27	25	18.5	15	22
34		Duncannon .....	..	27	14.5	17	16	..	Williamsport	22	22.5	19.5	19	21
25		Easton	29	28	14.5	7	20	..	Wyoming .....	..	24.5	19	15.5	22.5
28		East Penn Jet .....	..	28	13.5	6	19.5	..	York .....	..	28	12	16	12
23		East Pittsburgh	4.5	..	..	..	..	..	
21		East Stroudsburg .....	..	27	17.5	10.5	21.5	..						
..		Eddystone	29	32	10	13.5	15.5	..						
25.5		Elizabethtown .....	..	28	11.5	15	16	..						
21.5		Elizabethville .....	..	26.5	17	17.5	18	..						
23.5		Ellwood City	8	..	..	..	..	..	
32		Emlenton .....	..	21	25.5	29	30	..						
28		Ephrata .....	..	30	10.5	13.5	16.5	..						
21.5		Erie	19	15	32	31	32	15.5						
23		Franklin	16.5	19	28	29	29	18						
..		Fullerton .....	..	28	14	6.5	19.5	..						
..		Galeton .....	..	18.5	24	23.5	25	..						
..		Girard	18.5	16.5	32	32	33	14.5						
..		Greenville .....	..	19	30	31	31	..						
29		Hamburg .....	..	28	12	11	18.5	..						
24		Hanover .....	..	29	14	17.5	11.5	..						
24		Harrisburg .....	..	27	13	15.5	15	..						
24		Hatfield .....	..	30	11	9.5	18	..						
25.5		Hazleton .....	..	26.5	16.5	12	21	..						
26.5		Honesdale .....	..	26	21.5	18.5	25	..						
24		Kennett Square .....	..	31	8	15.5	14.5	..						
24		Kingston .....	..	25	19	15.5	22	..						
24		Kutztown .....	..	29	12.5	9	19	..						
24		Lancaster .....	..	29	9.5	14.5	14.5	..						
24		Landisville .....	..	28	10	14	14.5	..						
24		Lansdale	29	30	10	9.5	18	..						
24		Lansdowne .....	..	32	10.5	14	15.5	..						
24		Latrobe	8.5	..	..	..	..	..	
24		Lattimer Mines .....	..	26.5	17.5	12.5	21.5	..						
24		Lebanon .....	..	28	12	13	16.5	..						
26		Leechburg	7.25	..	..	..	..	..	
25		Lewistown .....	..	25.5	18	19.5	19	..						
..		Lock Haven .....	..	21.5	21	20	22	..						
..		Luzerne .....	..	24.5	19	15.5	22.5	..						
..		Manheim .....	..	29	10.5	13.5	13.5	..						
..		Marcus Hook .....	..	32	9.5	13.5	14.5	..						
..		Meadville .....	..	18.5	30	31	31	17.5						
..		Mechanicsburg .....	..	28	14.5	17	16.5	..						
..		Mifflinburg .....	..	25	19	18.5	20.5	..						
..		Millersburg .....	..	26	15.5	17.5	17.5	..						
..		Muncy .....	..	23	19	18.5	20	..						
..		Nanticoke .....	..	25	18.5	15.5	20.5	..						
..		Nazareth .....	..	29	14.5	8	20.5	..						
..		New Boston .....	..	27	14.5	12.5	20	..						
..		New Castle	9.25	..	..	..	..	15						
..		New Holland .....	..	29	8.5	14.5	16	..						
..		New Kensington	5.25	..	..	..	..	..	
..														
		BASING POINTS						BASING POINTS						
Rows	Worces-	To Pennsylvania	Pitts-	Buffalo	Coates-	Bethle-	Sparrows	Worces-	To Pennsylvania	Pitts-	Buffalo	Coates-	Bethle-	Sparrows
nt	ter		burgh		ville	hem	Point	ter		burgh		ville	hem	Point
..		Nicetown .....	..	31	10.5	12	16.5	..						
..		Norristown	29	31	9	10.5	17.5	..						
..		Northampton .....	..	28	14.5	7	19.5	..						
..		North East .....	..	13.5	32	31	32	..						
..		Oil City	17.5	18.5	28	29	29	..						
..		Pennsburg .....	..	29	14	8.5	19.5	..						
..		Philadelphia	29	31	10.5	12	15.5	..						
..		Phoenixville	28	30	8.5	11	17.5	..						
..		Pittston .....	..	24.5	19	15	22.5	..						
..		Plymouth .....	..	25	19	15.5	22	..						
..		Pottstown	27	30	10	12	18	..						
..		Pottsville	26.5	27	13.5	12.5	19	..						
..		Reading	27	29	10	10	17.5	..						
..		Scranton	27	24.5	19.5	16	23	..						
..		Shafon .....	..	24.5	26.5	27	26	..						
..		Shamokin .....	..	25.5	17.5	15	20	..						
..		Sharon	12	20	30	31	30	..						
..		Shippensburg .....	..	29	17	18.5	17	..						
..		Sunbury .....	..	24.5	17.5	17	19	..						
..		Tamaqua .....	..	27	14	10	19.5	..						
..		Titusville	18	17.5	29	29	30	..						
..		Union City .....	..	16.5	30	30	31	..						
..		Vandergrift	8	..	..	..	..	..	
..		Warren	20	15	28	28	29	..						
..		Wayne .....	..	32	9.5	13.5	17	..						
..		Waynesboro .....	..	30	18	19.5	14.5	..						
..		Weatherly .....	..	27	16.5	11.5	21	..						
..		West Chester .....	..	31	8.5	14	16	..						
..		Wilkes-Barre	27	25	18.5	15	22	..						
..		Williamsport	22	22.5	19.5	19	21	..						
..		Wyoming .....	..	24.5	19	15.5	22.5	..						
..		York .....	..	28	12	16	12	..						

imum, 40,000 lb.) From Leading Code Basing Points to Represent In Cents Per 100 lb.

BASING POINTS			BASING POINTS			BASING POINTS			BASING POINT			SOUTHERN							
thle-	Sparrows	Cleve-	To Ohio	Pitts-	Gary	To Indiana	Cleve-	Pitts-	Gary*	To Michigan	Cleve-		Pitts-	Gary	To Illinois	Gary or			
hem	Point	land		burgh			land	burgh			land	burgh		Chicago		(Rates Apply			
12	16.5	..	Akron	17.5	29	9.5	Indianapolis	26	30	18	Fennville	26	..	..	Alton	22	Shapes, Shee
10.5	17.5	..	Alliance	14	30	11.5	Jeffersonville	29	33	23.5	Fenton	22	..	..	Aurora	8	Bale Ties an
7	19.5	..	Ashtabula	18	31	11.5	Kendallville	21.5	28	16.5	Flat Rock (Wayne)	19	..	..	Batavia	8	
31	32	17	Athens	21.5	30	21	Kokomo	24.5	30	16.5	Flint	22	28	24	Belleville	22	To North Ca		
29	29	18.5	Bellaire	11.25	33	18.5	La Fayette	26.5	32	15	Gaylord	30	..	..	Belvidere	10	Asheville
8.5	19.5	..	Bellefontaine	23.5	24	18.5	La Porte	25.5	31	11	Grand Haven	27	33	20.5	Bloomington	16.5	Charlotte		
12	15.5	..	Bridgeport	11.25	33	18	Logansport	24.5	30	15	Grand Ledge	23	..	..	Centralia	22	Durham
11	17.5	..	Cambridge	17.5	30	18	Michigan City ...	26	32	8	Grand Rapids	25.5	31	20.5	Champaign	16.5	Gastonia		
15	22.5	..	Canton	16.5	29	12	Mishawaka	24.5	30	12.5	Greenville	25.5	..	..	Chicago Heights	4	Greensbo
15.5	22	..	Carrollton	16	31	14.5	Muncie	23	27	18	Harbor Beach	26.5	..	..	Danville	16.5	High Po
12	18	..	Cincinnati	26.5	25.5	23.5	New Albany	29	33	23.5	Hastings	23.5	..	..	Decatur	18	Nashville
12.5	19	..	Cleveland	18.5	28	..	Peru	24	30	15	Hillsdale	20.5	26.5	20.5	De Kalb	10	Raleigh		
10	17.5	..	Columbiana	11.25	32	15	South Bend	24.5	30	12.5	Holland	26	32	19.5	East St. Louis ..	22	Wilming		
16	23	..	Columbus	21	26.5	18.5	Terre Haute	29	33	18	Holly	21.5	..	..	Elgin	8	Winston-
27	26	..	Conneaut	18.5	31	13	Tipton	25	29	18	Homer	21.5	..	..	Evansston	8	
15	20	..	Coshocton	17.5	29	17	Valparaiso	26	32	11	Howell	20.5	..	..	Freeport	13	To South Ca
31	30	14	Cuyahoga Falls ..	17.5	29	9.5	Vincennes	31	35	22	Ionia	24.5	..	..	Galesburg	17	Charlest
18.5	17	..	Dayton	24.5	24	21	Wabash	23	29	16.5	Jackson	20.5	27	21.5	Geneva	8	Columbi		
17	19	..	East Liverpool ...	8.5	32	16.5	Warsaw	23	29	15	Kalamazoo	24	30	18.5	Granite City	22	Florence		
30	31	..	Elyria	19.5	27	9	*Freight rates from Chicago to Indiana points are 1.5c. to 3c. a 100 lb. higher.										Hammond	18	Gaffney
..	..	..	Finlay	23.5	23	17.5	To West Virginia		Pittsburgh	Cleveland	Lapeer	22.5	..	..	Joliet	8	Greenville
28	29	..	Fostoria	22.5	23.5	16	Bluefield	33	33		Lowell	25	..	..	Kankakee	10	Greenwo
13.5	17	..	Galion	21	26	14	Charleston	26	26		Ludington	30	..	..	Kewanee	14.5	Spartan
19.5	14.5	..	Gallipolis	23.5	31	23.5	Fairmont	17.5	..		Manistee	30	..	..	La Salle	13	Sumter
11.5	21	..	Hamilton	26	24.5	22.5	Huntington	25.5	25.5		Manistique	35	..	..	Lockport	8	To Georgia
14	16	..	Hubbard	12.5	32	13.5	Parkersburg	19.5	21.5		Marine City	24	..	..	Moline	17	Albany
15	22	..	Jackson	23.5	29	22.5	Wheeling	10.5	18.5		Marshall	22	..	..	Mount Vernon ..	22	Athens
19	21	..	Lancaster	21	28	20					Mason	22	..	..	Naperville	8	Atlanta
15.5	22.5	..	Lima	24.5	22	19					Menominee	35	39	24	North Chicago ..	8	Augusta		
16	12	..	Lisbon	11.25	32	14.5					Midland	25	..	..	Ottawa	12	Columb
..	..	..	Lorain	19.5	27	9					Milan	18.5	..	..	Pekin	16.5	La Gr
19.5	6.5	31.0	Mansfield	20.5	26.5	14					Monroe	18.5	..	..	Peoria	16.5	Macon
21.5	20	33.0	Marietta	22	24.5	16.5	To Kentucky		Pittsburgh	Gary	Mount Pleasant ..	25.5	..	..	Princeton	14.5	Rome
19	17.5	31.0	Marion	22	24.5	16.5	Ashland	26	31		Muskegon	27	33	21	Rockford	12	Savann		
33	21	34.0	Martins Ferry ...	10.5	32	18	Bowling Green	49	42		Niles	24.5	31	14.5	Rock Island	17	Waycro		
..	..	..	Massillon	17	29	12.5	Covington	26.5	25.5		Northville	20.5	..	..	St. Charles	8	To Florida
16.5	11.5	29.0	Mount Vernon ...	20	27	17.5	Henderson	38	28		Otsego	25	..	..	Seneca	10	Dayton
19.5	12	33.0	Newark	19.5	28	18.5	Lexington	32	30		Ososgo	22.5	..	..	Springfield	18	Gainesv
20	15	34.0	Niles	12.5	31	12	Louisville	33	26.5		Petoskey	32	37	29	Streator	13	Jackson		
18	9.5	30.0	Norwalk	20.5	25.5	12	Newport	26.5	25.5		Plainwell	24.5	..	..	Urbana	16.5	Lakela
17.5	10	29.0	Painesville	18	30	9	Owensboro	41	29.5		Plymouth	20	..	..	Vandalia	22	Waukeg
23	21	34.0	Portsmouth	25.5	30	23.5	Paducah	40	29		Pontiac	21	27	25	Waukegan	8	Miami		
20.5	16	33.0	Salem	12	31	13					Fort Huron	23	29	27	Wheaton	8	Orland		
..	..	..	Sandusky	21.5	25.5	12	To Michigan		Cleve-	Pitts-	Quincy	21	..	..	Wilmette	8	Pensac
21.5	8	33	Sbelby	21	26	13	Adrian	18.5	..	..	River Rouge	20	26.5	25	Woodstock	10	St. A
..	..	..	Springfield	23	25	20	Albion	21.5	28	21	Saginaw	24	30	25		St. Pa	
18.5	16	30	Steubenville	8.5	32	17.5	Allegan	25	..	..	Sandusky	25	..	..		Tallah	
14.5	13	28	Struthers	10.5	31	..	Alma	24.5	..	..	Sturgis	22.5	..	..		West F	
..	..	..	Toledo	23.5	23.5	17	Alpena	30	..	..	Saint Johns	23.5	..	..		To Alaban	
..	..	..	Upper Sandusky ..	22.5	24.5	..	Ann Arbor	19.5	25.5	23	Saint Joseph	26	..	..		Annik	
21.5	10.5	..	Urbana	23.5	24.5	19	Bad Axe	26	..	..	Tecumseh	19	..	..		Decatu	
..	..	..	Warren	13.25	31	11.5	Battle Creek	22.5	29	19.5	Three Rivers	23.5	..	..		Dotha	
..	..	..	Wooster	18.5	28	13	Bay City	24.5	31	25.5	Traverse City	31	36	26		Gadsd	
..	..	..	Youngstown	11.25	31	13	Belding	25	..	..	Wayne	19.5	..	..		Fond du Lac	19
21.5	11	..	Zanesville	19	29	18.5	Bellevue	23	Wyandotte	19.5	26	25		Green Bay	21.5*	Montg	
30	22	..					Benton Harbor ...	26	32	15.25	Ypsilanti	19.5	26	23.5		Hartford	18.5	Phoen	
26.5	22	..	To Indiana		Cleve-	Pitts-	Big Rapids	27	33	23.5						Janesville	12	Selma	
27	19.5	..	Anderson	24	Buchanan	25.5						Kenosha	11.5	Tusca	
40.5	37	..	Auburn	21	27	16.5	Cadillac	28						La Crosse	28*		
40.5	34.5	..	Brasil	28	32	18	Cassopolis	24.5						Madison	14	To Missi	
44	34.5	..	Columbus	26.5	30	22	Charlevoix	32						Manitowoc	20	Green	
24	15.5	..	Connersville	24	28	20	Charlotte	22.5						Milwaukee	12*	Gulph	
28	23.5	..	Crawfordsville ..	27	32	18	Cheboygan	32	37	32						Neenah	20.5	Hatti	
25.5	21	..	East Chicago	28	34	3	Chelsea	20						North Milwaukee	12	Jack	
28	20.5	..	Elkhart	23.5	30	15	Corunna	22.5						Oconomowoc ...	14.5	Laur	
30	22	..	Elwood	24.5	29	18	Detroit	20	26.5	25						Oshkosh	20	Meri	
27	23.5	..	Evansville	38	36	23.5	Dearborn	20	26.5	25						Racine	12	Nate	
28	20.5	..	Fort Wayne	21	27	16.5	Dowagiac	25.5						Sheboygan	18.5	Vick	
21.5	10.5	..	Hammond	28	34	3	Ecorse	20	26.5	25						Superior	31		
27	19.5	..	Huntington	22	28	16.5	Evart	27						Waukesha	12	To Louis	
31	25	..	Indiana Harbor ..	28	34	3										West Allis	12	Alex	
22	17.5	..																Bato	

NOTE: Arbitrary deductions of \$3 to \$5 a ton are allowed on rates to Detroit and southern Michigan cities on bars, blooms, billets and slabs, hot and cold-rolled sheets and hot-rolled strip. On bars, other than cold-finished and blooms, billets and slabs, the rate to Detroit from Pittsburgh is 15c. a 100 lb., while on cold-finished bars, sheets and hot-rolled strip, it is 20c. Other southern Michigan points take a 20c. rate on the first classification and 25c. on cold-finished bars, sheets and hot-rolled strip.

*The rate on tin plate to Eau Claire is 27.5c.; to Green Bay, 21c. and to La Crosse, 24.5c. Milwaukee takes a special rate of 8.5c. on bars, plates and structural steel.

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Basing Points to Represent

BASING POINTS				BASING POINT		
	Cleveland	Pittsburgh	Gary		Gary or Chicago	(Rates A Shapes, S Bale Ties
Michigan				To Illinois		
Alton	26	..	..	Alton	22	
Aurora	22	..	..	Aurora	8	
Batavia	19	..	..	Batavia	8	
Belleville	22	28	24	Belleville	22	To North
Belvidere	30	..	..	Belvidere	10	Ashev
Bloomington	27	33	20.5	Bloomington	16.5	Charl
Cairo	23	..	..	Cairo	26	Durh
Centralia	25.5	31	20.5	Centralia	22	Gasto
Champaign	25.5	..	..	Champaign	16.5	Green
Chicago Heights	26.5	..	..	Chicago Heights	4	High
Danville	23.5	..	..	Danville	16.5	Nashv
Decatur	20.5	26.5	20.5	Decatur	18	Raleig
De Kalb	26	32	19.5	De Kalb	10	Willm
East St. Louis	21.5	..	..	East St. Louis	22	Winst
Elgin	21.5	..	..	Elgin	8	
Evanston	20.5	..	..	Evanston	8	To South
Freeport	24.5	..	..	Freeport	13	Ande
Galesburg	20.5	..	..	Galesburg	17	Charl
Geneva	20.5	27	21.5	Geneva	8	Colum
Granite City	24	30	18.5	Granite City	22	Flore
Hammond	22.5	29	21.5	Hammond	18	Gaffn
Joliet	22.5	..	..	Joliet	8	Green
Kankakee	25	..	..	Kankakee	10	Green
Kewanee	30	..	..	Kewanee	14.5	Spart
La Salle	30	..	..	La Salle	13	Sumt
Lockport	30	..	..	Lockport	8	
Moline	35	..	..	Moline	17	To Georg
Mount Vernon	24	..	..	Mount Vernon	22	Alban
Naperville	22	..	..	Naperville	8	Ather
North Chicago	22	..	..	North Chicago	8	Atlan
Ottawa	35	39	24	Ottawa	12	Augu
Pekin	25	..	..	Pekin	16.5	Colum
Peoria	18.5	..	..	Peoria	16.5	La C
Princeton	18.5	..	..	Princeton	14.5	Macon
Rockford	21	27	26.5	Rockford	12	Rome
Rock Island	25.5	..	..	Rock Island	17	Savar
St. Charles	27	33	21	St. Charles	8	Wayc
Seneca	24.5	31	14.5	Seneca	10	To Florid
Springfield	20.5	..	..	Springfield	18	Dayto
Streator	25	..	..	Streator	13	Gaine
Urbana	22.5	..	..	Urbana	16.5	Jacks
Vandalia	25	..	..	Vandalia	22	Lakel
Waukegan	32	37	29	Waukegan	8	Miam
Wheaton	24.5	..	..	Wheaton	8	Orlan
Wilmette	20	..	..	Wilmette	8	Pensa
Woodstock	21	27	25	Woodstock	10	St. A
	23	29	27			St. I
	21	..	..			Talla
	20	..	..			Tamp
	21	..	..			West
	20	26.5	25			To Alaba
	24	30	25			Anni
	25	..	..			Decat
	22.5	..	..			Dotha
	23.5	..	..			Gads
	26	..	..			Mobil
	19	..	..			Mont
	23.5	..	..			Phoe
	31	36	26			Selma
	19.5	..	..			Tusca
	19.5	26	25			To Missi
	19.5	26	23.5			Green
						Gulft
						Hatti
						Jack
						Laur
						Meri
						Nate
						Vick
						To Louis
						Alex
						Bato
						Boga
						La K
						Lake
						Monr
						New
						Shr

TE: Arbitrary deductions of \$3 to ton are allowed on rates to Detroit southern Michigan cities on bars, s, billets and slabs, hot and cold sheets and hot-rolled strip. On other than cold-finished and blooms, and slabs, the rate to Detroit from burgh is 15c. a 100 lb., while on cold-finished bars, sheets and hot-rolled strip, 20c. Other southern Michigan points 20c. rate on the first classification 5c. on cold-finished bars, sheets and rolled strip.

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Representative Consuming Centers

INT
y or
ago

SOUTHERN STATES

(Rates Apply on Bars, Plates, Shapes, Sheets, Hoops, Bands, Bale Ties and Wire Products)

Basing Point
Birming-

To North Carolina ham

Asheville	36
Charlotte	39
Durham	46
Gastonia	37
Greensboro	45
High Point.....	44
Nashville	49
Raleigh	46
Wilmington	46
Winston-Salem..	44

To South Carolina

Anderson	31
Charleston	38
Columbia	38
Florence	43
Gaffney	35
Greenville	32
Greenwood	32
Spartanburg	34
Sumter	41

To Georgia

Albany	28
Athens	26
Atlanta	22
Augusta	33
Columbus	21
La Grange.....	22
Macon	28
Rome	19
Savannah	38
Waycross	35

To Florida

Daytona	50
Gainesville	45
Jacksonville	38
Lakeland	52.5
Miami	55
Orlando	52.5
Pensacola	28
St. Augustine..	42
St. Petersburg..	61
Tallahassee	33
Tampa	52.5
West Palm Beach	55

To Alabama

Anniston	13.5
Decatur	15.5
Dothan	25
Gadsden	13
Mobile	28
Montgomery	17
Phoenix City...	21
Selma	18
Tuscaloosa	12.5

To Mississippi

Greenville	34
Gulfport	31
Hattiesburg	27
Jackson	27
Laurel	25
Meridian	21
Natchez	34
Vicksburg	30

To Louisiana

Alexandria	58
Baton Rouge....	34
Bogalusa	34
La Fayette	AB40
Lake Charles....	AB40
Monroe	51
New Orleans....	34
Shreveport	58

Basing Point
Birming-

To Arkansas ham

Blytheville	48
El Dorado	55
Fort Smith.....	60
Hot Springs.....	55
Jonesboro	48
Little Rock.....	51
Pine Bluff.....	51
Texarkana	60

To Tennessee

Bristol	36
Chattanooga	20
Cleveland	22
Jackson	25
Johnson City...	35
Kingsport	34
Knoxville	28
Memphis	28
Nashville	24

To Oklahoma

Enid	77
Lawton	77
Muskogee	66
Oklahoma City..	72
Okmulgee	66
Ponca City.....	77
Seminole	72
Shawnee	72
Tulsa	72

Freight Rates on Finished Steel Products and Tin Plate from Gary or Chicago

Products
Sheets Tin Plate

To Colorado

Boulder	78	75
Colorado City.....	78	75
Colorado Springs...	78	75
Cripple Creek.....	134.5	144.5
Denver	77	75
Golden	85.5	83.5
Leadville	95	75
Pueblo	78	75
Trinidad	80	75

To Iowa

Ames	36	36
Bettendorf	17	17
Burlington	19	19
Cedar Rapids.....	28	28
Charles City.....	28	28
Clinton	16.5	16.5
Council Bluffs....	45	45
Creston	39	39
Davenport	17	17
Des Moines.....	37	37
Dubuque	17	17
Fort Dodge.....	38	38
Fort Madison.....	19	19
Iowa City.....	28	28
Keokuk	20	20
Marshalltown	28	28
Mason City.....	28	28
Oelwein	28	28
Ottumwa	32	32
Sioux City.....	46	46
Waterloo	28	28

To Kansas

Abilene	54	54
Girard	51	51
Kansas City.....	42	42
Leavenworth	44	44
Topeka	48	48
Wichita	58	58

To Minnesota

Bemidji	54	54
Duluth	31	31
Hibbing	50	50

To Minnesota

Mankato	42	42
Minneapolis	28	28
North St. Paul....	28	28
St. Cloud.....	46	46
St. Paul.....	28	28
Steeltown	31	31
Virginia	50	50
Winona	28	28

To Missouri

Cape Girardeau....	37	56
Hannibal	20	20
Jefferson City.....	38	38
Joplin	57	57
Kansas City.....	42	42
St. Charles.....	31	31
St. Joseph.....	42	42
St. Louis.....	22	22
Springfield	41	50

To Nebraska

Alliance	71	71
Hastings	55	55
Lincoln	49	49
Omaha	45	45
West Point.....	50	50

To Nevada

Las Vegas.....	100	75
Reno	100	75
Tonopah	165	140

To North Dakota

Bismarck	69	69
Fargo	57	57
Grand Forks.....	60	60

To South Dakota

Aberdeen	58	58
Pierre	64	64
Sioux Falls.....	47	47

To Utah

Ogden	95	75
Provo	95	75
Salt Lake City.....	95	75

To Wyoming

Cheyenne	76	72
Cody	100	75
Laramie	95	75
Sheridan	85	75

NOTE: Washington, Oregon, California, Idaho, Montana, Arizona and New Mexico consuming points usually take an arbitrary all-rail rate of 75c. per 100 lb. on tin plate from both Pittsburgh and Gary. Other finished steel products shipped to these states ordinarily take a rate of \$1.15 per 100 lb. from Pittsburgh and \$1 from Gary or Chicago.



Mining and Metallurgical Engineers Discuss Problems at Metal Congress

ALL other factors being equal, the deep stamping qualities of any material are in inverse proportion to the resultant compressive stresses divided by the nominal ultimate strength and are in inverse proportion to the position of the material's modified stress-strain curve found in dividing all unit stresses by the nominal ultimate strength.

So declared Dr. M. H. Sommer, consulting metallurgical engineer, New York, in a paper on the "Relation Between the Plastic Deformation in Deep Drawing and the Tensile Properties of Various Materials" which was presented in Detroit, October 5, at a joint session of the Institute of Metals and the Iron and Steel Divisions of the American Institute of Mining and Metallurgical Engineers. In the absence of Dr. Sommer the paper was read by A. B. Kinzel, chief metallurgist, Union Carbide & Carbon Research Laboratories, Inc.

Dr. Sommer showed that curves which were constructed in accordance with these statements are in satisfactory agreement with both experiments and actual practice, in particular with the Erichson values on deep drawing properties. The modified stress-strain curves allow the drawing of valuable conclusions on the behaviour of the metal in subsequent drawing operations without intermediate annealing and show clearly the effects of the work hardening of certain metals in such operations.

The limits to which the metal can be drawn in a first drawing operation without fracture are shown under the assumption of the ideal state of drawing without friction and under conditions closely approaching the actual performance in practice.

Straight lines which express these limits have been entered into the diagram of the deepstamping characteristics, also conforming satisfactorily with actual experience. They are in agreement with the known fact that the permissible reduction in one draw is less for thin gage material and small blank diameters than for heavier gage metal and large blank diameters.

Dr. Sommer has drawn curves, called "deep stamping" characteristics, for copper, brass, aluminum, Armco ingot iron and three stainless chromium steels. These curves show the relative position of these metals with regard to their deep drawing properties and allow an accurate determination of the theoretical as well as the practical limits to which these metals can be drawn in one stamping operation.

Following Dr. Sommer's paper, Cyril Stanley Smith, American Brass Co., Waterbury, Conn., presented a paper on "The Interconversion of Atomic Weight and Volume Percentages in Binary and Ternary Systems." Dr. Kinzel made a non-technical talk on "Silicon" at the dinner meeting of the two divisions.

must be plated, and a non-rusting base metal is highly desirable. On the outside of the car a non-rusting base metal for plated parts is even more desirable than on the inside. Running board moldings, cowl moldings, trunk moldings and metal window frames in the rear curtains of open cars are examples of plated parts for which a plated non-rusting white metal seems ideal. Rolled zinc is utilized to some extent for such parts, said Mr. Peirce.

While unalloyed rolled zinc is generally considered too soft to serve satisfactorily for hub caps, a stiff rolled zinc alloy has been put through rigorous tests which show that it is well adapted for this purpose. Drawn zinc cans are commonly used for condensers in the ignition system, and certain gaskets have been successfully made of zinc, declared Mr. Peirce. Rolled zinc is employed for scuff plates and the recent development of drawn zinc reflectors for flashlights is causing new interest in the possibilities of drawn zinc headlight reflectors.

The startling economies effected by zinc die castings in the automotive industry, asserted Mr. Peirce, are attributable more to reduced fabricating cost than to a decrease in raw materials cost. The versatility of the die casting process makes possible such flexibility of design that a single die casting frequently replaces more than one part previously made by other methods. This in turn cuts down machining and assembly expenses, appearance is improved and in most cases a better design from a functional standpoint is possible.

Alloy development has been so satisfactory that the mechanical properties attainable in a die cast part are seldom a limitation in utilizing zinc die castings, except for highly stressed parts where steel obviously is required.

The first thing about a 1933 car which greets the eye is likely to be the radiator front with a zinc die cast frame or molding, said Mr. Peirce. On one of the current cars the saving per car by using a zinc die casting instead of a stamping totaled \$1. In this case a saving of \$8000 in the initial cost of tooling for this part also was achieved.

By using zinc die castings in the assembly of the complicated mechanism of a vacuum clutch, one manu-

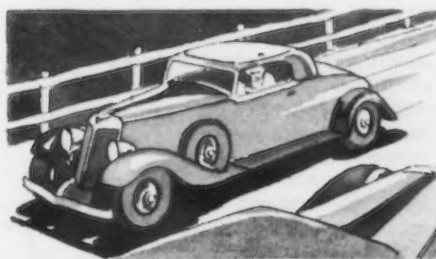
Zinc Competes on Cost of Use Basis

THE average automobile today contains 25 to 30 lb. of zinc in the form of zinc die castings and rolled zinc, and in certain cars the amount runs as high as 60 lb., stated W. M. Peirce, New Jersey Zinc Co., Inc., New York, in an address before the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers at Detroit. Even at present-day price levels, zinc has a considerable advantage in cost per unit volume over many competitive materials.

Mr. Peirce said that strip zinc is widely used for a group of parts, including the instrument panel, instrument dials and name plate, which are stamped out of a flat sheet and finished by lithographing with enamels or chemical coatings. Here a non-rusting material, having no require-

ments of strength or forming properties, is specified.

Rolled zinc offers satisfactory service at minimum cost when employed for metal parts involving comparatively simple forming operations, such as the instrument bezels, dome light rims and ash trays. These parts



facturer has reduced the cost of parts 90 per cent, representing a saving of several dollars per assembly. A zinc die cast horn projector, polished and plated, cost half that of a horn projector of another material polished and plated.

Mr. Peirce cited satisfactory applications of zinc die castings outside the automotive field. A new gasoline pump has been made economically possible only through zinc die castings. This pump registers not only gallons and tenths of gallons, but also simultaneously records the selling price in dollars and cents. The pump saves the time necessary to calculate the charge, eliminates the possibility of a mistake, makes it easy for the purchaser to buy an even dollar's worth of gasoline and permits him to have his tank filled regardless of the fraction of a gallon required. The selling price of the pump, of course, is higher than that of the ordinary pump, and the manufacturer wished to limit initial production to 2500 units. Only the extensive use of zinc

die castings (over 50 zinc die cast gears and housings) made it feasible to produce this limited number of pumps at a competitive price and introduce it successfully to the trade.

It is a little startling, said Mr. Peirce, to think of using a zinc die casting to replace a sheet metal stamping partially on the basis of weight saving, yet this was done in the instance of a clock case. A zinc die cast case, weighing 15 to 20 per cent less than the equivalent stamping, gave better rigidity than the stamping at a cost per part of 6c. as against 8½c. for the stamping.

A journal bearing is now being made by die casting zinc at a saving of 35 to 50 per cent, this bearing being interchangeable for a plain bushing or a ball bearing. The bearing is made self-aligning through the use of a spherical shell and bushing which can be economically produced by die casting. The bushing is a zinc die casting with a bronze tube insert as the bearing. Weight has been reduced and appearance improved.

plating should be only 0.0002 to 0.0004 in. thick and the chromium 0.00002 in. thick. The grilles on the newer cars might well be made of brass or some of the other high-strength copper alloys, because they then would be free from the danger of rusting and from early destruction of the plating.

Bearings made of pressed copper and other powdered metals, requiring no babbiting, are satisfactory, asserted Mr. Schneider. They are compressed to such density that about 15 per cent of their volume is in the nature of a void which may be filled with oil. Even if all oil is drained from the crankcase, this results in an oil film at the surface for a considerable period of time. This kind of bearing possesses strength, is easily made, requires little if any machining and compares favorably in cost with the cheapest kind of bearings. Because of its inherent qualities copper is ideal as a gasket.

Mr. Schneider emphasized that the methods adopted by the automobile industry to produce cheaper cars may properly be questioned. The quality of the cars has been lowered, and in the effort to preserve profits through mass production, cars are being made, whether by design or not, which need early replacement. This does not, in the long run, build up consumer confidence. It has been demonstrated many times that a satisfactory product will be selected in preference to the cheaper one, because of the poor service the latter will give.

Average Motor Car Contains 45 Pounds of Copper

NEXT to the electrical, the automobile industry is the largest consumer of copper, the average motor car using 45 lb., said William G. Schneider, Copper & Brass Research Association, New York, in a paper read at the meeting in Detroit on Oct. 5 of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers.

The low-priced car contains from 25 to 45 lb. of copper, the medium-price car 65 lb. and the high-priced car 90 lb. Of the 45-lb. average, about 10 lb. is used for electrical equipment, including the generator, starter, wiring, coils and similar parts. In 1929 the automotive industry took 150,000 tons of copper, in 1930 100,000 tons, in 1931 70,000 tons and in 1932 40,000 tons.

Because of their resistance to corrosion, copper and brass are used almost exclusively for radiator cores, which account for about 20 lb. of copper per car. Miscellaneous plated parts, including headlights and hub caps, take 5 lb. Brass hardware, lock parts, copper in die castings, screws and other miscellaneous products add another 5 lb. Bearings and bushings likewise demand 5 lb., and 1 lb. of copper per year per car in service is utilized for replacement purposes.

Mr. Schneider remarked that at certain price levels it is possible to produce certain brass parts on an automatic screw machine for about 60 per cent of the cost of the same parts if made of steel. This is not so surprising, he said, if one considers that the spindle speed for cutting and forming brass in r.p.m.'s may be from 2 to 3 times that for steel, and r.p.m.'s for tapping about 6 or 7 times as

much. With brass, production per day may be from 2 to 5 times as great as when steel is worked.

To produce a satisfactory chrome plating on brass, it is necessary only to nickel plate and buff before applying the chromium. The nickel

Aluminum in Automotive Field

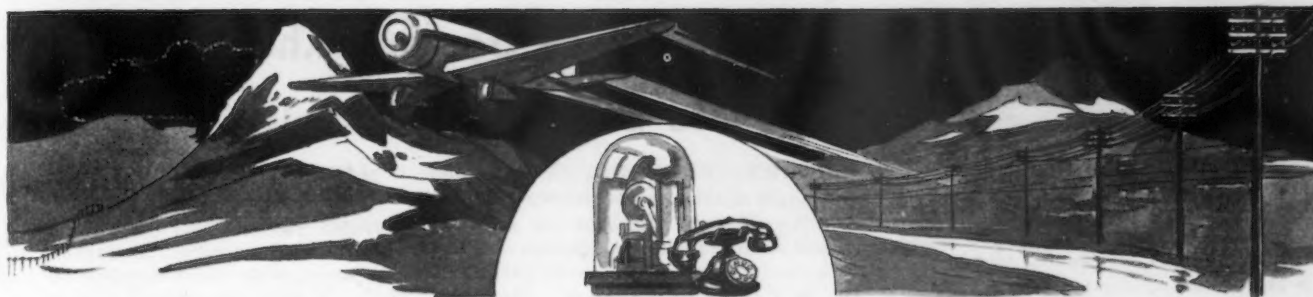
HIGH thermal conductivity and light weight in comparison with other metals are the two major characteristics upon which the use of aluminum in the automotive field depends, declared E. H. Dix, Jr., chief metallurgist Aluminum Research Laboratories, New Kensington, Pa., in discussing aluminum in the automobile industry at the Detroit meeting of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers. Its pleasing color, high corrosion resistance and ease of machining and forming also are contributing factors.

The trend toward higher speeds today means that more attention must be given to reduction in weight of reciprocating parts, said Mr. Dix. In pistons and connecting rods a decrease in weight results in maximum advantage to the user in the form of greater power and smoothness with smaller maintenance cost. Forged aluminum connecting rods have been employed in high quality cars for a number of years. In pistons the inherent advantages of high thermal conductivity are more important today than ever before. On the other hand, pointed out Mr. Dix, the difficulties which have been due to the difference in the coefficient of ex-

pansion of aluminum and cast iron cylinder blocks have been progressively reduced by important developments in design during the last 15 to 20 years.

Perfection of the permanent mold process of casting has been one of the greatest factors in improving aluminum pistons. Until about three years ago no basic change had been made in the aluminum alloy used for pistons, but the development of the "Lo-Ex" alloy has brought a 15 per cent lower thermal expansivity and improved wear resistance and hardness. The technique of casting and machining this alloy represents a high stage of development. This alloy contains 14 per cent silicon, 1 per cent magnesium, 2.5 per cent nickel, 1 per cent iron and 0.9 per cent copper.

Aside from economies arising from lower machining costs, the advantages of the aluminum cylinder head in automobiles are many. The high heat conductivity of aluminum produces a more even distribution of heat, preventing hot spots and permitting the use of higher compression ratios, thus making possible increased power with smoother operation. Since this improvement is solely the result of greater efficiency, it is secured without added operating cost.



THE NEWS OF THIS WEEK

Steel Ingot Production in September Dropped 20.3 Per Cent Under August

BESSEMER and open-hearth steel ingot production in September declined 20.3 per cent from the preceding month, amounting to 2,310,982 tons, or 88,884 tons daily, according to the calculations of the American Iron and Steel Institute. August production was 2,900,611 tons, or 107,430 tons daily, while 3,203,810 tons, or 128,152 tons daily, was made during July.

The industry's total steel making capacity was engaged at 40.89 per cent last month, as compared with 49.42 per cent in August, 58.95 per cent in July and 17.64 per cent in September, 1932.

Ingot production in the first nine months of 1933 was 17,404,595 tons, as against 10,342,520 in the corresponding 1932 period, with 13,322,833 in the entire year of 1932.

Screw Machine Products Makers Are Organized

THE National Screw Machine Products Association, with membership confined to manufacturers of products which could be made on single or multiple spindle automatic or hand screw machine equipment, was re-

cently organized at a meeting of representatives of the industry at Buffalo.

The association is being made up of concerns who do a jobbing business in the manufacture of such products or manufacture these products to suit customers' drawing or samples for assembly of machinery or apparatus, into a complete unit by their customers. This includes parts made of bar stock on screw machine equipment and includes the use of free cutting steel, alloy steels for heat treating, stainless steel, brass and bronze, Monel metal, nickel silver, aluminum and, in fact, any metal which can be secured in bar form, preferably cold drawn or cold rolled.

At the organization meeting 146 manufacturers were represented. The total number of manufacturers who might be eligible for membership in the association would be something less than 300. The association has applied for and been accepted for membership in the Fabricated Metal Products Federation, and its plants are operating under such code until such time as the Government is ready to consider its own code which has been prepared and is ready to submit at the proper time.

The following officers have been elected: David Bell, David Bell Co., Buffalo, president; George Briggs, Screw Machine Products Corp., Providence, vice-president; C. C. Heath, Brown-McLaren Co., Detroit, secretary, and E. A. Schneider, Hudson Screw Machine Product Co., Chicago, treasurer.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS (Gross Tons)

Reported for 1933 by Companies Which Made 96.57 Per Cent of 1932 Ingot Output

1933	Open-Hearth	Bessemer	Calculated Output All Companies		No. of Working Days	Per Cent Operation
			Monthly	Daily		
January	885,743	109,000	1,030,075	39,618	26	18.23
February	922,806	126,781	1,086,867	45,286	24	20.83
March	784,168	94,509	909,886	33,699	27	15.50
April	1,180,893	135,217	1,362,856	54,514	25	25.08
May	1,716,482	216,841	2,001,991	74,148	27	34.11
June	2,211,657	296,765	2,597,517	99,904	26	45.96
July	2,738,083	355,336	3,203,810	128,152	26	58.95
August	2,430,750	370,370	2,900,611	107,430	27	49.42
September	1,991,242	240,473	2,310,982	88,884	26	40.89
Nine months	14,861,824	1,945,792	17,404,595	74,698	233	34.36

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1932, of 67,386,130 gross tons for Bessemer and open-hearth steel ingots.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS (Gross Tons)

Reported for 1932 by Companies Which Made 93.71 Per Cent of 1931 Ingot Output

1932	Open-Hearth	Bessemer	Calculated Output All Companies		No. of Working Days	Per Cent Operation
			Monthly	Daily		
January	1,230,907	160,633	1,484,991	57,115	26	26.41
February	1,230,970	157,067	1,481,253	59,250	25	27.40
March	1,149,193	193,944	1,433,337	53,087	27	24.55
April	1,036,163	144,197	1,259,629	48,447	26	22.40
May	950,838	103,593	1,125,243	43,279	26	20.01
June	755,068	100,249	912,757	35,106	26	16.23
July	653,039	102,916	806,722	32,269	25	14.92
August	696,122	97,323	846,730	31,360	27	14.50
September	804,470	124,970	991,858	38,148	26	17.64
October	885,773	132,876	1,087,058	41,810	26	19.33
November	838,419	128,844	1,032,221	39,701	26	18.36
December	724,917	81,932	861,034	33,117	26	15.31
Total	10,955,879	1,528,544	13,322,833	42,701	312	19.75

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1931, of 67,473,630 gross tons for Bessemer and open-hearth steel ingots.

National Safety Council Officers Are Elected

JOHAN E. LONG, Delaware & Hudson Railroad Corp., Albany, N. Y., was elected president of the National Safety Council at its twenty-second annual congress, held Oct. 2 to 6 at Chicago. Other new officers are: Managing director, W. H. Cameron, Chicago; treasurer, W. E. Worth, International Harvester Co., Chicago; vice-president for finance, G. T. Hellmuth, Chicago North Shore & Mil-

waukee Railroad Co., Chicago; vice-president for public safety, Robert I. Catlin, Aetna Life Insurance Co., Hartford, Conn.; vice-president for engineering, J. E. Culliney, Bethlehem Steel Co., Bethlehem, Pa.; vice-president for membership, R. T. Solensten, Elliott Service Co., New York; vice-president for business administration, C. W. Smith, Standard Oil Co. (Ind.), Chicago; vice-president for the division of safety councils, Lew R. Palmer, Equitable Life Assurance Society, New York; vice-president for industrial safety, George H. Warfel, Union Pacific Railroad Co., Omaha, Neb.; vice-president for health, Dr. C. H. Watson, American Telephone & Telegraph Co., New York, and vice-president for education, A. W. Whitney, National Bureau of Casualty & Surety Underwriters, New York.

Gray Iron Industry Gets NRA Concessions

THE gray iron foundry industry has secured concessions from the NRA allowing the fixing of 40 hours per week as the maximum work period for employees outside of watchmen. This is provided in a substitute to a clause in the President's re-employment agreement or blanket code that provided for a 40-hr. week for six weeks and a 35-hr. week for the remainder of the year. A new provision regarding watchmen fixes their period of employment at not more than the average number of hours they worked during the first six months of 1933. Final hearing on the Gray Iron Code will be set shortly.

Consolidated M. & S. Gains in Output

MONTREAL, Que.—With the exception of gold, third quarter production by the Consolidated Mining & Smelting Co. of Canada shows expansion over the third quarter of 1932, according to official figures. For the September quarter the company produced 31,521 tons of lead; 16,289 tons of zinc; 7418 ounces of gold and 1,485,393 ounces of silver. In the corresponding three months of last year production included 29,262 tons of lead; 15,877 tons of zinc; 8837 ounces gold and 1,263,068 ounces silver.

For the first nine months of the year Smelter's output compared with that of 1932 was as follows:

	1933	1932
Lead, tons.....	91,757	92,061
Zinc, tons.....	46,043	50,127
Copper, tons.....	.....	383
Gold, ounces....	17,384	24,441
Silver, ounces....	4,235,393	4,214,366

British Pig Iron Bought Ahead — Tin Plate Bars Advanced

LONDON, ENGLAND, Oct. 10.—(By Cable).—The improvement in British pig iron is maintained, with consumers buying ahead into next year and producers preparing to light more furnaces. Makers of semi-finished steel are also well situated and some are refusing to accept specification for November delivery. On the whole, steel mills are well employed, although rail and ship specifications are lacking.

Welsh tin plate bars have been advanced 5 shillings a ton to £5 per ton delivered. Tin plates are steadier although business is still quiet.

Continental steel continues unsettled with exchange movements hampering business in United Kingdom markets. An improvement in demand is observed from Central and South America, India and China, but Japanese competition is felt in the Dutch East Indies.

At its recent Paris meeting the raw steel cartel called attention to increased sales to South America by the United States, due to the depreciation of the dollar. Steps are being consid-

ered by cartel members to protect continental interests in these markets.

Dutch pig iron output for 1932 and 1933 totaled 233,000 metric tons as compared with 256,000 tons during 1931. Ninety per cent of this output was exported. It is doubted that this rate can be maintained. Efforts are being made to compensate for this by increasing Dutch steel output.

Sheet Steel Sales Off Further in August

WITH sales reflecting a further decrease, production and shipments of sheet steel products in August increased moderately, scoring gains for the fifth consecutive month. According to the report of the National Association of Flat Rolled Steel Manufacturers, Pittsburgh, which bases its figures on a monthly capacity of 325,000 net tons, or approximately 59 per cent of the country's total capacity of 550,000 net tons monthly, independent makers reported sales of 158,830 net tons in August, compared with 174,191 tons in July; production of 203,893 tons, against 188,143 tons, and shipments of 174,480 tons compared with 174,145 tons. Unfilled tonnage on Sept. 1 aggregated 212,879 tons or 65.6 per cent of capacity, compared with 228,696 tons or 70.5 per cent of capacity in the preceding period. The August report with comparisons of the two preceding months, in net tons, follows:

	August	July	June
Sales	158,830	174,191	246,787
Production	203,893	188,143	166,272
Shipments	174,480	174,145	152,953
Unfilled orders....	212,879	228,696	229,436
Unshipped orders..	64,583	62,720	54,288
Unsold stocks.....	51,293	42,095	50,067
Capacity per month	550,000	550,000	550,000
Percentage reporting	59.0	59.0	59.0
Percentages, Based on Capacity			
Sales	48.9	53.7	76.0
Production	62.8	58.0	51.2
Shipments	53.8	53.7	47.1
Unfilled orders....	65.6	70.5	70.7
Unshipped orders..	19.9	19.3	16.7
Unsold stocks.....	15.8	13.0	15.4

Superior Steel to Roll Hot Strip From Silcrome

ANNOUNCEMENT is made that the Superior Steel Co., Pittsburgh, has been granted by the Ludlum Steel Co., Watervliet, N. Y., the exclusive rights to roll hot strip steel from Silcrome stainless steel, and to roll cold strip from the same steel as is now being done by the Wallingford Steel Co., Wallingford, Conn.

British Prices, f.o.b. United Kingdom Ports

	Per Gross Ton
Ferromanganese, export	\$9
Billets, open-hrth.	\$5 5s. to \$5 12s. 6d.
Black sheets, Japanese specifications	\$11
Tin plate, per base box	16s. 9d. to 17s.
Steel bars, open-hearth	\$7 17½s. to \$8 7½s.
Beams, open-hrth.	\$7 7½s. to \$7 17½s.
Channels, open-hearth	\$7 12½s. to \$8 2½s.
Angles, open-hearth	\$7 7½s. to \$7 17½s.
Black sheets, No. 24 gage.....	\$9 5s.
Galvanized sheets, No. 24 gage.....	\$11 5s. to \$11 15s.

Continental Prices, f.o.b. Continental Ports

	Per Metric Ton, Gold £ at \$4.86
*Ingots	\$2 5s.
*Billets, Thomas..	\$2 7s.
Wire rods, No. 5 B.W.G.	\$4 10s.
Black sheets, No. 31 gage, Japanese	\$11 5s.
*Steel bars, merchant	\$3
*Sheet bars.....	\$2 8s.
Plates, ¼ in. and up	\$3 18s. 6d.
*Plates, ½ in. and 5 mm.	\$4 1s.
*Sheets, ½ in.	\$4 6s.
*Ship plates.....	\$4 10s.
*Beams, Thomas. ..	\$2 16s. 6d.
*Angles (basis)....	\$3
Hoops and strip steel over 6-in. base	\$3 15s.
Wire, plain, No. 8. ..	\$5 7s. 6d.
Wire nails.....	\$5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G. ..	\$8 15s.

*Prices as established by European Raw Steel Cartel.

Great Lakes Ore Shipments Reflect Increasing Activity

AN increase of 753 per cent in ore shipments from upper Lake ports for September, 1933, over the preceding year, and an increase of 581 per cent for the first 9

months of 1933 over the same period of 1932 are shown by the last comparative statement of ore shipments issued by the Lake Superior Iron Ore Association.

Port and Dock	September, 1932	Percentage of Total	September, 1933	Percentage of Total
Escanaba—C. & N. W.....	15,627	2.44	210,921	3.83
Escanaba—C. M. & St. P....	22,009	3.43	118,058	2.15
Marquette—D. S. S. & A....	8,187	1.28	92,488	1.68
Marquette—L. S. & I.....	60,486	9.43	540,119	9.81
Ashland—C. & N. W.....	36,668	5.72	427,644	7.77
Ashland—Soo Line.....	68,618	10.70	146,658	2.66
Superior—Great Nor.....	88,089	13.74	1,361,525	24.74
Superior—Soo Line.....	4,056	0.63	68,035	1.24
Superior—Nor. Pac.....	3,350	0.52	65,043	1.18
Duluth—D. M. & N.....	246,093	38.38	1,614,769	29.34
Two Harbors—D. M. & N....	88,045	13.73	858,915	15.60
Total	641,228	100.00	5,504,175	100.00
	1933 increase.....		4,862,947	758.38

Port and Dock	To Oct. 1, 1932	Percentage of Total	To Oct. 1, 1933	Percentage of Total
Escanaba—C. & N. W.....	124,386	5.20	751,542	4.61
Escanaba—C. M. & St. P....	61,131	2.56	322,363	1.98
Marquette—D. S. S. & A....	77,182	3.23	316,176	1.94
Marquette—L. S. & I.....	91,876	3.84	1,491,803	9.15
Ashland—C. & N. W.....	138,392	5.79	1,274,772	7.82
Ashland—Soo Line.....	209,905	8.78	602,714	3.70
Superior—Great Nor.....	563,009	23.55	3,760,628	23.07
Superior—Soo Line.....	34,246	1.43	280,020	1.72
Superior—Nor. Pac.....	27,320	1.14	221,314	1.36
Duluth—D. M. & N.....	742,215	31.04	4,654,107	28.55
Two Harbors—D. M. & N....	321,493	13.44	2,624,134	16.10
Total	2,391,155	100.00	16,301,573	100.00
	1933 increase.....		13,910,418	581.74

Continental Steel Markets Subject to Price Cutting—Large Rail Orders

THE International Rail Makers Association is threatened by the vigorous competition of two British makers who are not members, and by the Polish and Italian-Spanish industry. Poland is executing orders for 60,000 tons for Brazil, and Italy takes care of most of the Egyptian and Near East demand. Spain is booking orders from Uruguay and Argentina. However, the IRMA has secured the order for rails to supply the Haifa Bagdad Railroad, amounting to 145,000 tons, which will be started early in 1934. Approximately 20 per cent of the tonnage will go to the United States. The distribution of 45,000 tons of accessories will be similar to the rail division.

The continental wire rod cartel, facing keen American competition in the Far East, has lowered prices from 7 to 10 per cent c.i.f. Japan.

The 40-hr. week has now been ac-

cepted by the entire German iron, steel, machinery and non-ferrous metal industry and the Krümpersystem by nearly 90 per cent of the industry. The Krümpersystem will employ all skilled men in fixed periods. For example, in Central Westfalia, the men will be on the pay roll for eight weeks, and thereafter three weeks on the dole, to return thereafter for eight more weeks. In other districts the dole period will range from two to four weeks, thus giving periodic employment to all iron, steel and machinery workers.

Price cutting is again prevalent in the European steel business, and the cartel's c.i.f. quotations include many price concessions to buyers, which are very difficult to control. Fearing to lose all control of the market, the cartel contemplates the abandonment of c.i.f. prices and return to f.o.b. prices, which are easier to control.

The AVI export return system, or refund to manufacturers of the difference between domestic and export prices, which is used in Germany and Austria, has now been also accepted by the Polish steel industry. Poland is paying to the Polish machine tool makers \$22 (gold) for each ton of machine tool exports as an export subsidy. The Polish machine tool industry is almost entirely in hands of Polish mechanics and engineers which were formerly employed in American machine tool manufacturing plants.

Additional Applications of Copper Alloys

THE new Bronx County Court House in New York utilizes bronze for ornamentation to a greater degree than any other comparable structure, according to a recent bulletin of the Copper and Brass Research Association. Over 125,000,000 lb. of copper alloys were used in the building for water lines, spandrels, windows, doors, and lighting fixtures. In many cases copper radiators were used to conserve space. The New Christian Science Publishing building at Boston is also featured by the liberal use of copper alloys, and has lead-coated copper window sills, which are individually drained to prevent water from running down the side of the building.

Corrugated Sheet Iron In Sumatra

NATIVE preference for corrugated sheet iron as a house-building material has resulted in a growing demand for that product in Sumatra, according to Vice-consul W. D. Thorne, in a report made public by the Commerce Department.

The natives state that, because of wearing qualities and resistance to the seepage of rain water even in the most violent tropical storms, corrugated sheet iron is more suitable than available forest products.

Various unique uses of corrugated sheet iron by the natives are cited in the report. Tinsmiths pound it out flat and employ it for making buckets and similar utensils. Drivers of bullock-carts erect a framework over the body of the vehicle and cover the whole with a roof of corrugated iron.

The Sumatran rubber and tobacco estates are also large users of corrugated iron in connection with building construction, the report shows.

American corrugated iron has been imported into Sumatra from time to time, but price competition has limited its sale. In view of the depreciation of the dollar, prospects of American participation in this trade would appear to be more favorable.

PWA Announces Federal Aid— Non-Federal Allotments

WASHINGTON, Oct. 10.—The Public Works Administration has made an allotment of \$2,800,000 to begin construction of the annex to the Library of Congress. Of this total \$300,000 will be spent for the foundation calling for 672 tons of reinforcing bars, and \$2,500,000 for the superstructure, involving 1100 tons of structural shapes. The annex, a \$5,000,000 project, will be built directly across the street from the main library with which it will be connected by an underground tunnel. Plans and specifications for the foundation have been completed and bids will be advertised at once.

Included in allotments of 16 non-federal projects in eight states, with a total construction cost of \$6,565,068, are \$3,101,333 for highways and bridges for Erie county, New York; \$1,198,900 for a high school and \$1,148,370 for a storm drain for Buffalo.

Public Works Administrator Harold L. Ickes said that work can start immediately on the Erie county project, for which a loan and grant were made. Work also can start at once on the construction of the Filimore-Lovejoy storm drain in Buffalo, for which a loan and a grant were made, while

work on the high school in Buffalo, for which a loan and a grant were made, can start in four weeks.

Other allotments made are:

Hammond, Ind., \$700,000, loan and grant, for construction of filtration plant. Work can start within 30 days.

Fort Steilacoom, Wash., \$70,000, grant, to State of Washington, to construct hospital and ward building. Work can start at once.

Clarke County, Ga., \$79,665, loan and grant, for school building and road improvements. Work can start at once.

Lena, Ill., \$70,000, loan and grant, for construction of school building. Work can start in one month.

Versailles, Ky., \$67,000, loan and grant, for installation of water supply from Kentucky river, including pumping station, intake, pipe lines and storage facilities. Work can start at once.

A grant of \$300,000 has also been made to Florida for road construction. The grant is in addition to Florida's share in the \$400,000,000 national recovery highway fund.

the current year totaled 135,156 tons, an increase of 18,584 tons over those in the corresponding period of last year. The bulk of the 1933 orders consisted of oil storage tanks, 45,945 tons, and miscellaneous, 74,137 tons.

Non-Ferrous Ingot Code Hearing Friday

WASHINGTON, Oct. 10.—Hearings will be held on Friday of this week on the non-ferrous ingot metal industry's code before Deputy Administrator H. O. King. The proposed code fixes a minimum wage of \$15 a week for office employees in cities of 500,000 population, scale down to \$12 in towns of less than 2500 population. The minimum wage for other employees is fixed at 35c. per hour for males and 30c. per hour for females, and it is provided there shall be no differential where substantially the same character of work is performed.

The code proposes a maximum work week of 40-hr. for employees engaged in smelting and refining of secondary metals, except during peak periods limited to six weeks in any six months, and provided that no employee shall work more than six days or more than 48-hr. in any one week, or more than 10-hr. in any one day.

These hours do not apply to employees in case of emergency or where safety to men or preservation of property is involved; nor do they apply to executives and those in technical capacities receiving \$35 a week or more, or to outside salesmen and watchmen who may be employed not to exceed 56-hr. a week.

I. C. C. Denies Switching Charge Petition

WASHINGTON, Oct. 10.—The Interstate Commerce Commission last Wednesday announced that it had denied petition asking suspension of proposed increased and reduced rates for intrastate switching services in Indiana and Illinois, within the Chicago switching district and between Chicago Heights, Ill., on the one hand, and the Chicago district on the other. The new rates are to become effective Oct. 20. Petitions for suspension of the rates were filed by the Acme Steel Co., the Board of Trade of Chicago, the Illinois Commerce Commission, the Public Service Commission of Indiana, and others.

Special Tin Plate Carload Rates to Stand

WASHINGTON, Oct. 10.—The Interstate Commerce Commission has suspended until May 5, 1934, the operation of schedules which propose to cancel special commodity rates on tin or terne plate, in carloads, from producing points in Indiana, Ohio, Pennsylvania and West Virginia, to Dallas and Houston, Tex., by rail-barge-rail routes, leaving higher rates in effect.

The following rates, stated in cents per 100-lb., are illustrative:

	From Pittsburgh, Pa.	Gary, Ind.
To	Proposed	Present
Dallas	86c.	66c.
Houston	89c.	65c.

Will the Recovery Act arrive even within the shadows of its goal? In a volume entitled "Business Under the Recovery Act," by L. Valenstein and E. B. Weiss, published by the McGraw-Hill Book Co., Inc., New York, the authors contend that it will be less than 50 per cent effective in its administration and application, but will accomplish enough to justify permanent continuance on the statute books. The future business structure is envisaged, and analyses are made of merchandising, selling, advertising, wholesaling and retailing in the new era. Industrial bootlegging and 40 unfair competitive practices are discussed. Appendices include the President's Message, the Recovery Act in full, the Textile Code and miscellaneous bulletins.

Black and Galvanized Shapes in Navy Award

WASHINGTON, Oct. 10.—The Navy Department has awarded 1110 tons of galvanized shapes and 611 tons of black shapes for 10 destroyers. Galvanized shapes were awarded as follows: John T. Hill, for the Phoenix Iron Works, 870 tons; Enterprise Galvanizing Co., 128 tons and Joseph P. Cattie & Bro., 112 tons. Black shapes were distributed as follows: John T. Hill, 455 tons; Bethlehem Steel Co., 81 tons and Carnegie Steel Co., 75 tons. There remain 375 tons of J. & L. Junior galvanized beams to be awarded.

Steel Plate Orders Down in August

WASHINGTON, Oct. 10.—Orders for fabricated steel plate declined to 15,714 tons in August from 20,058 tons in July, according to reports received by the Bureau of the Census from 48 manufacturers. The August tonnage was distributed as follows: Oil storage tanks, 2079; refinery materials and equipment, 1885; tank cars, 1030; blast furnaces, 5; miscellaneous, 10,715.

Orders in the first eight months of

PWA Works Two Shifts On Construction Allotments

WASHINGTON, Oct. 10.—Working double shifts of examiners night and day, the Public Works Administration is pushing vigorously to speed up employment on construction projects and in the production of materials required. Its stimulated efforts brought out a record list of 61 allotments to non-federal projects, aggregating \$5,411,900, for any single batch, announced last Wednesday by Federal Administrator of Public Works Harold L. Ickes.

The Administration does not attempt to state what the specific requirements for materials will be, but the character of the projects in this list shows that considerable structural steel will be necessary, and it is planned to get orders on the books of the mills at an early date. Among the projects are five bridges, one to be built by a loan and grant of \$1,400,000 to the State of Massachusetts. The bridge will span Saugus river between Lynn and Revere. A loan, amounting to \$103,400, was made to the Continental Bridge Co., for the construction of a toll bridge across Oaklawn Bay in Franklin-Wakulla counties, Florida. To the same company also was made a loan of \$148,087 to build a toll bridge across Powell's lake in Bay county, Florida. It was stated that work can start at once on the Massachusetts and the Bay County projects, while it can be started in 15 days on the Franklin-Wakulla job. This work apparently refers to excavation, but it is understood that designs and drawings are completed and that materials can be ordered at an early date.

Other projects embraced in the list are sewers, waterworks, hospitals, street lights, schools, roads, municipal buildings, heating plants, power plants, parks, etc. Practically all of the projects can be started soon, some at once, it was stated.

These particular allotments brought the total from the \$3,300,000,000 Public Works fund up to \$1,659,003,310. On the list outright grants only of 30 per cent of the cost of labor and materials were given 44 projects, while 15 received both grants and loans and two loans only.

Among other allotments were:

Annapolis, Md., \$490,000, loan and grant, for construction of storm sewer, drain, intercepting sewers, pumping station and sewage treatment works. Work can start in 60 days.

Boston, \$422,000, loan and grant, to State of Massachusetts, for construction of additions and better-

ments to power house at state hospital. Work can be started in one month.

Boston, \$334,000, loan and grant, to State of Massachusetts, for building for male employees at Boston State hospital. Work can start at once.

Boston, \$18,000, loan and grant, to State of Massachusetts, for construction of carpenter shop at Boston State hospital. Work can start at once.

Dallas, Tex., grant, \$195,000, to aid in construction of storm sewers, mains, laterals, etc. Total cost, \$791,815. Work can start at once.

Providence, R. I., \$171,000, grant, to aid in extension of water works system. Total cost, \$703,000. Work can start at once.

Honolulu, T. H., \$160,000, grant, reservoirs and pipe lines to extend water system. Total cost, \$650,000. Work can start at once.

Code Hearings and NRA Modifications

WASHINGTON, Oct. 10.—Sponsored by the Rolling Door Institute Association, a hearing will be held on Saturday of the present week on the code of fair competition for the rolling steel door industry. The hearing will be conducted by Deputy Administrator Malcolm Pirnie. The proposed code fixes a maximum work week of 40 hr., and not more than 8 hr. in any one day for factory workers. The proposed hourly rate of pay is 40c.

A hearing on the code of fair competition for the coated abrasives industry was held last Thursday before Assistant Deputy George S. Brady. The industry employs about 2500 men and has an annual output of \$2,500,000. George Link, Jr., New York, presented the code for the Coated Abrasives Association, said to represent 99 per cent of the industry.

Mr. Link estimated that on the basis of the 40-hr. week proposed employment would be increased about 18 per cent. The minimum wage proposed is 36c. an hour. Matthew J. Burns, representing labor in the industry, proposed a rate of 42c.

The NRA has announced the modification of the President's Reemployment Agreement with the following industries:

Cutting die manufacturing: For employees other than factory workers, a maximum work week of 40-hr.; for factory workers, 40-hr., and not more than 8-hr. in any one day.

Refrigerating machinery: For em-

Baltimore, \$135,000, grant, to aid in construction of three-story tuberculosis and six-story addition to city hospital. Total cost, \$560,000. Work can start in 60 days.

Baltimore, \$124,000, grant, to aid in construction of additions to four existing school buildings. Total cost, \$520,000. Work can begin in one month.

Baltimore, \$45,000, grant, to aid in construction and repair of roads and streets. Total cost, \$190,000. Work can start at once.

Baltimore, \$39,000, grant, to aid in construction of pumping station. Total cost, \$160,000. Work can start in six weeks.

Baltimore, \$60,000, grant, to aid in construction of two modern sludge digestion tanks. Total cost, \$250,000. Work can start in 30 days.

Springfield, Mass., \$126,000, grant, to resurface 16 streets. Total cost, \$448,000. Work can start at once.

Springfield, Mass., \$110,000, grant, for installation of relief sewer and four sections of storm drain. Total cost, \$423,000. Work can start at once.

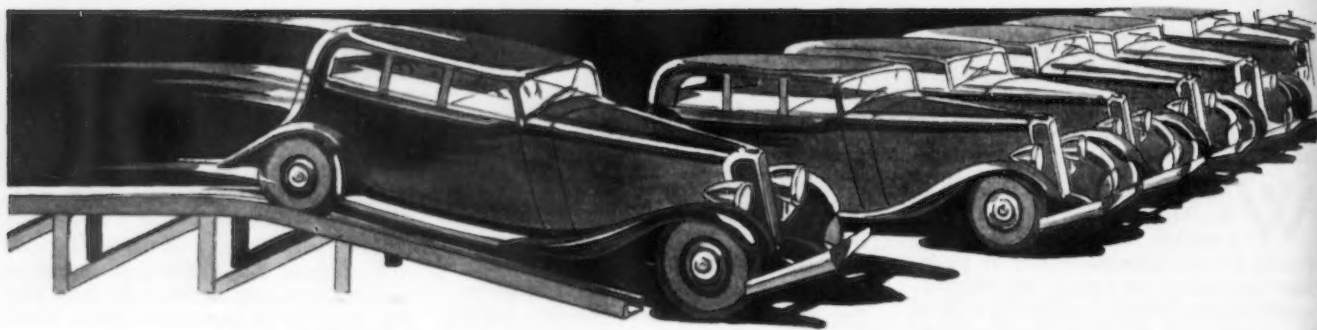
employees other than factory workers, a maximum work week of 40-hr.; for factory workers, other than outside classifications and repair crews, a maximum work week of 35-hr., and not more than 8-hr. in any one day; for erectors, 40-hr.

Drop forging: For employees other than factory workers and outside salesmen a maximum work week of 40-hr.; same provision for factory workers. Maximum wage for factory workers, 40c.

Commercial vehicle body manufacturing: For employees other than factory workers and outside salesmen, a maximum work week of 40-hr.; same for factory workers, with provision that they shall not work more than 8-hr. in any one day. Minimum wage for factory workers, 40c. unless rate was lower on July 15, 1929; in no event less than 30c.

Gray iron foundry: For employees other than factory workers and outside salesmen, maximum work week, 40-hr.; same for factory workers.

A PANORAMA of events—nearly 2500 discoveries and inventions—occurring in the United States, have been carefully documented and are briefly discussed in "Famous First Facts," by Joseph Nathan Kane, published by the H. W. Wilson Co., New York. Among the "firsts" are included the first boiler plate made by Dr. Charles Lukens at "Brandywine Mill"; first rolled brass in 1802 by Abel Porter & Co.; first "U" and "T" rails rolled at Mount Savage Mill; first Siemens-Martin open-hearth steel at Trenton, N. J.



▲ ▲ ▲ THIS WEEK ON THE ASSEMBLY LINE ▲ ▲ ▲

Introduction of 1934 Models to Be Delayed by Tool and Die Strike

DETROIT, Oct. 10.

THE automobile industry has entered the annual period when current models still are coming off the line in reduced volume, yet major attention must be concentrated on preparing production facilities for the change-over to next year's requirements. The strike of tool and die makers has further complicated an already intricate set-up. Motor car manufacturers at Detroit, Pontiac and Flint have been compelled to put out tool and die work in shops in various mid-western cities as well as in the East. Ordinarily this work would be done in part in their own plants and a portion in the independent shops in this city. Because of the inability of local shops to guarantee to deliver the dies and tools by a specified time, a large amount of business already placed here has been cancelled by automobile companies and the contracts given to shops in other districts. C. C. Richards, president of the Automotive Tool & Die Manufacturers Association, estimates that the local trade has lost \$3,000,000 worth of tool and die work in this manner in the last 10 days. Taking advantage of the dilemma in which local companies find themselves, tool and die manufacturers from distant points have been flying to Detroit in an effort to secure a share of the business.

Many motor car companies heretofore have insisted upon their tool and die work being kept in the Detroit district because of convenience and the ease with which necessary changes can be made quickly in case of a shift in plans. This has long been an almost insurmountable barrier to outside shops in participating widely in the automotive tool and die business. However, now that auto-

mobile makers are compelled to turn for help to shops outside Michigan, the latter feel that perhaps this is only an entering wedge whereby they can become a regular source of supply rather than merely a rescue agent in the present emergency.

Low Price Car Makers Hurry New Models

Admittedly the low-price car company which first introduces 1934 models will obtain an attractive volume of "pick-up" business. Therefore two important manufacturers now are straining their efforts towards the goal of a first showing. The outcome depends solely on which company can get its tools and dies the quicker. One of the two companies is said to have been a little slow in deciding what it wanted to do, the result being that when it was ready to place tool and die orders the shops best equipped to do the work were loaded to capacity. Even if a strike settlement should be reached in the next week, it is conservatively estimated that new models will be delayed two to three weeks. For example, one prominent maker had scheduled the first cars of its 1934 series to come off the line about Nov. 1, but it now estimates that the earliest it could possibly finish the first car is Nov. 15.

While the strike has had no effect on the flow of steel from mills to Michigan consuming plants, it has slackened the demand for steel out of local warehouses. The automobile trade is well supplied with steel for its first production run on new cars and any delay in fresh buying of steel will be in exact proportion to the delay in tooling up on the part of automotive plants. It is believed that

the first volume purchases of steel at the new code prices will not occur until some time in November.

As they come to light, September figures reveal some astonishing facts regarding production and sales. Members of the National Automobile Chamber of Commerce, representing the entire industry aside from Ford, turned out 139,153 cars last month, an increase of 190 per cent over the same month of 1932. The nine-months' output this year, at 1,294,582 units, is 54 per cent ahead of that in the same period of last year. Almost trebling the 20,995 units it made in September of 1932, Chevrolet last month assembled 59,357 units, resulting in the best September record since 1929. For the first nine months of this year Chevrolet manufactured 571,781 units, or 45 per cent more cars than in the entire year of 1932. Plymouth's sales in the final week of September totaled 7524 units, or only 70 less than its all-time peak record. During the month Plymouth shipped from its local factory 33,395 units. All divisions of Chrysler Corp. delivered at retail 13,300 units in the week ended Sept. 30. This represented the best week's business in more than five years. Hudson's sales were 43 per cent better than in September, 1932, while Reo's shipments were double those in the same month of last year. Packard produced 1514 cars in September, and its dealers sold 1325 cars. It still had 940 unfilled orders on its books on Oct. 1. Packard's business last month, measured in dollar volume of sales, was the best in more than two years. Preliminary estimates of domestic passenger car sales in September, made by R. L. Polk & Co., approximated 141,000 units, exceeding the totals for the same month in 1931 and

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1932 and closely approaching the total for 1930. Truck sales were put at 30,000 units, compared with 28,807 in August.

October Schedules Encouraging

Projected schedules for October, considering the season of the year, are encouraging. Chevrolet will turn out about 35,000 cars, while Chrysler Corp. is expected to drop off only slightly from its September total, said to have been 50,000 to 55,000 cars. Ford's production is believed to be approximately 2000 units a day, five days a week.

With steel prices soaring, Ford is warming up its open-hearth furnaces at the Rouge plant preparatory to making steel. These furnaces have been idle more than a year, during which the prediction frequently was ventured that Ford would never again operate them. Not many months ago the steel trade pictured the Ford steel mills sold to a prominent steel company said to be seeking the opportunity of operating a mill here, but Mr. Ford spiked the story by stating that the best way to maintain a balance in the steel industry so far as production at Detroit was concerned was for him to retain his steel plant. The usually large scrap pile at Rouge has been cut down to a very small tonnage in recent months, some steel companies having taken sizable amounts of scrap from Ford by boat in return for steel. Ford likewise has been selling scrap from current production in the open market. It is reported that Ford will have to buy little if any scrap to replenish depleted stocks, because the tonnage produced at Rouge is sufficient to supply the steel plant's normal needs.

An inquiry from the Ford Motor Co. for 10,000 tons of basic pig iron for delivery to the Rouge plant is another indication that Ford shortly will resume the making of steel.

A motor car manufacturer which is installing a spring making department to build coil springs for its 1934 line of cars has placed orders for about \$200,000 worth of machine tools. This is in addition to equipment amounting to \$250,000 purchased about ten days ago. Its buying program for the new department involving a total expenditure of from \$450,000 to \$500,000 constitutes the second largest transaction of the year in the local equipment market.

Fisher Body Corp. is said to have bought a fair tonnage of sheets for its Cleveland plant which works on Chevrolet and Pontiac bodies, paying the new code prices. This order represents tonnage for which the sizes were not known in time to give releases at the old prices. Chrysler is the only large automotive steel user which has not yet found it necessary to come into the market and pay fourth quarter prices.

Detroit Notes

Pig iron shipments to the automotive trade are suffering somewhat this

month on account of seasonal conditions and the large amount of iron taken by users on third quarter contracts at lower prices. . . . Individually sprung front wheels and coil springs continue to be the problem on which most makers are concentrating their attention. . . . Willys-Overland has asked the federal court

at Toledo to permit it to spend \$12,000 for experimental work to find out whether it will be desirable to expend \$125,000 for tool changes and \$300,000 for other changes for production of a new Willys 99 six-cylinder model to be put on the market in January and for changes in design of the Willys 77.

Radical Element in Control in Detroit Toolmakers' Strike

DETROIT, Oct. 10.—After the strike of local tool and die makers had lasted a week, a group of automobile companies on Wednesday issued a public statement, regarded as an ultimatum, declaring that those employees for whom there is work who do not return to work by Friday would "be deemed to have severed all relations with their respective companies and are directed to remove their tools forthwith." The statement further declared that the manufacturers were operating in good faith under the code for their industry and "will continue to operate their shops under the code and in accordance with the principles of NRA." It set forth the fact that "there was no known controversy between them and their former employees in tool and die departments when the men stopped work."

This statement was signed by Cadillac Motor Car Co., Chevrolet Motor Co., Dodge Brothers Corp., Fisher Body Corp., Hudson Motor Car Co., Packard Motor Car Co. and Plymouth Motor Corp. Concurrently with this action on the part of automobile companies, 38 independent tool and die shops published a similar statement.

The deadline on Friday was crossed with only about 500 men returning to their jobs. Chester M. Culver, manager of the Employers' Association of Detroit, estimates that at the peak 6300 men were on strike. Of that number 3300 were employed in automobile factories and 3000 in independent shops. To date about 1100 men have gone back to the automobile companies and 600 to the outside shops, said Mr. Culver. The strikers' committee denies these figures, stating that almost 11,000 men are still out in Detroit and a total of 20,000 at Detroit, Pontiac and Flint.

Mr. Culver outlined the situation in the following statement:

"The strike was initiated by the Mechanics' Educational Society. This organization was formed in March of this year and chartered under the laws of Michigan in June. The thought and purpose of its organizers was what its name implies, an educational trade organization. It sought its membership among the tool and die makers. As its membership in-

creased, a number of radicals saw a rare opportunity and joined its ranks.

"The strike began in Flint and immediately a Flint committee came to the Detroit organization demanding that they go out in sympathy in order to bring the Flint employers to time. In the face of strong opposition a strike vote was ordered, the responsible officials declaring that no strike would be called unless at least a 50 per cent vote was cast. The voting was to continue through Saturday, Sunday and Monday.

"At the meeting Monday night when the votes were to be canvassed, a row broke out requiring police presence. The next day the papers reported that 4000 votes had been cast, although by Sunday night only 2000 votes were reported. In the face of the fact that they claimed a membership of over 9000, this would not show even a 50 per cent vote. The radicals appeared to be in control and the strike was ordered. Practically all jobbing tool and die shops are out and most of the die departments in the automobile and body shops.

No Demands Were Made Before Walkout

"In many of the tool and die shops employers asked their men why they were striking. The only answer was that the organization had ordered it. No demands of any kind were made previous to the walkout, nor have any formal demands ever been presented to the automobile manufacturers. Demands have been reported through the press, but they have varied from edition to edition. Saturday, the fifth day of the strike, at the suggestion of Mr. Carmody, a representative of Senator Wagner's Labor Board at Washington, demands were presented to a committee of the jobbing tool shops.

"The majority of the men on strike have gone out because of fear induced by threats of pickets not only of bodily harm, but molestation of their homes and families and threats that they would make life miserable for them on the job after the strike was over.

"Strike leaders admit that in many of the shops conditions are favorable, and the rates paid are equal to their

latest demands, but that it is necessary to strike all employers so as to put up a solid front against the 'employing class.'

It is authoritatively stated that the tool and die makers when they struck were being paid hourly rates in the large majority of the shops equal to or in excess of those prevailing at the peak of 1929.

Strike Committee Criticizes Mediator

John M. Carmody, National Labor Board's strike mediator, who has not participated in meetings between the employers and strikers since Saturday, Sept. 30, when negotiations were ended, declares that the basic difficulty holding back a settlement is the fact that "Detroit automobile manufacturers are slow in recognizing that under the industrial set-up by the NRA they are face-to-face with a wholly new relationship between them and their employees. This principle is collective bargaining."

"Settlement of the dispute as between the manufacturers here in Detroit and their men is held up by the fact that the manufacturers refuse to recognize the principle of collective bargaining and will not negotiate. There would be small argument, I believe, as to wages and hours were the collective bargaining factor removed," declared Mr. Carmody.

The joint strike committee of the Mechanics' Educational Society on Sunday sent to the National Recovery Administration at Washington a memorandum charging not only that employers in the Detroit, Pontiac, Flint area are violating the NRA, but also that John M. Carmody, federal mediator, is aiding them in evading the provisions of the law.

Elaborating on its charges against Mr. Carmody the committee declares, "his activity has been confined to discussing the matters involved in this controversy with the men and we assume with the employers. There has been nothing done by Mr. Carmody which has not been the customary practice of federal conciliators for decades prior to the enactment of the NRA. There is no necessity for assigning to this work one who acts as a conveyor of messages. We are frank to state that his participation in this controversy does not fall within our conception of the function of one whose duty it is to effectuate the objects of the legislation which gave rise to his position."

The strikers thus take the position that it is Mr. Carmody's duty as the representative of the National Labor Board to compel the employers of the tool and die makers to bargain collectively with them and to see that in such bargaining a satisfactory agreement is reached. Maurice Sugar, attorney for the committee and one of the signers of the memorandum, has long been identified with Detroit's radical element and is one of the city's most ardent champions of the Soviet regime in Russia.

OBITUARY

CHARLES E. THOMPSON, president of Thompson Products Co., Cleveland, one of the largest producers of automobile and aircrafts valves, died on Oct. 4, at Emergency Hospital, Washington. Mr. Thompson's death followed an attack of acute indigestion with which he was stricken at his



C. E. THOMPSON

room in the Wardman Park Hotel, in the capital.

Pioneer in high-powered motor development and known as the father of America's greatest aviation speed, Mr. Thompson, who was 63 years of age, had gone to Washington to confer with National Recovery Administrator Hugh S. Johnson regarding a metal trade code. His death marked the end of a colorful career which played a highly important part in the effect on aviation development.

Engineers paid tribute to his pioneering work in the development of valves which has made possible the efficiency of motors of all types. Mr. Thompson's first step in the production of automotive parts was the result of his observing the opportunity to effect a saving in the manufacture of valves, then being turned from solid steel bars, by electrically welding the valve head to the stem from which the valve finally was machine-finished. He organized the company which he headed and which has plants in Cleveland and Detroit, and was credited with being the first to introduce the use of alloy steel into the manufacture of valves. He spent large sums for construction of better and speedier airplanes and led in developing the modern high-speed, high-temperature valves. His valve permitted use of the type of engine which gained world prominence by the historic solo trans-Atlantic flight of Charles A. Lindbergh in 1927. Mr. Thompson, in 1929, established the famous Thompson trophy, competed

for each Labor day as the climax of the national air races. He also was the first president of the Glenn L. Martin Co., Baltimore, maker of aircraft, including the new Martin bomber. Research work in connection with the Thompson trophy racers has been a big factor in developing high-speed transport planes common to the large American air lines. Mr. Thompson was also an organizer of the American Airways Corp. One of his sons, Edwin G. Thompson, is treasurer and vice-president of Thompson Products, Inc.

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HORACE P. YALE, from 1870 to 1915, prominent in the special machinery manufacturing and mill supply business, died at his home in Milwaukee on Sept. 30, aged 83 years. He was born in Milwaukee in 1850, and in 1870 helped establish the Arnold & Yale Machinery Co. Later he became the sole owner and the name was changed to H. P. Yale & Co. The business was sold in 1915, when Mr. Yale retired.

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WILLIAM HORTON HODGES, formerly manager of the Thomson-Houston Welding Co., Lynn, Mass., died on Oct. 4, after a short illness. He was born in Pawtucket, R. I., 81 years ago.

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EDWARD D. KILBURN, formerly vice-president and general sales manager of the Westinghouse Electric & Mfg. Co., East Pittsburgh, died of a heart attack in New York on Oct. 4, aged 58 years. He was graduated from Cornell University in 1906, and was identified with the Westinghouse organization, successively as manager of the New York power and railroad department, manager of the New



E. D. KILBURN

York district office, and vice-president and general manager of the Westinghouse International Co. He resigned in April, 1930, to engage in business on his own account.

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HUGH BRYSON WICK, formerly president and chairman of the board of Steel & Tubes, Inc., Cleveland, and one of the founders of the company, died Oct. 8, aged 64 years. He was born in Youngstown, Ohio, where his father Henry Wick was prominently identified with the steel industry. With his father he started the Elyria Iron & Steel Co., Elyria, Ohio, in 1902. The company later built plants in Cleveland, Toledo and Guelph, Ontario. In 1915 the name was changed to Steel & Tubes, Inc. Mr. Wick became president of the company after his father's death and held that position until 1927 when he was succeeded by Myron A. Wick, of Youngstown. At that time he became chairman of the board but resigned the following year when the company became a unit of the Republic Steel Corp. Since then he had not been actively engaged in business.

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STEWART HENRY CHISHOLM, who played a conspicuous part in the development of the steel industry in Cleveland, died at his home in that city Oct. 8, aged 86 years. He was a son of Henry Chisholm, one of the pioneers in the steel industry in Cleveland. He was a native of Montreal, Canada, from where his parents moved to Cleveland when he was three years of age. His first employment was with Stone, Chisholm & Jones, in which firm his father was a partner and which eventually merged into the Cleveland Rolling Mill Co., of which he later became vice-president. With John W. Gates and others Mr. Chisholm in 1898 organized the American Steel & Wire Co. of Illinois, which was formed as a preliminary step in effecting the organization a year later of the present American Steel & Wire Co. of New Jersey. Mr. Chisholm served as vice-president of the latter company for a year or two. He also organized the H. P. Nail Co., Cleveland, which was taken over by the present American Steel & Wire Co. This company was formerly a manufacturer of horseshoe nails but later changed to the manufacture of wire nails. He also organized the Chisholm-Moore Mfg. Co., Cleveland, to manufacture chain hoists and malleable castings. He retired in 1900.

Paper-thin sheet copper, produced electrolytically, is now being used for laying built-up roofs and for decorative window displays, and was recently used to make diplomas for a Western high school, according to a bulletin of the Copper and Brass Research Association.

PERSONALS

FRANK F. SLICK has been appointed general superintendent of the Edgar Thomson works, Carnegie Steel Co., at Braddock, Pa. For the past five months he has been acting general superintendent. He was born at Johnstown, Pa., and has been continuously employed by the Carnegie Steel Co. since March 1, 1896. **JOHN LLOYD**, who has been superintendent of the rolling department at Braddock, has been



F. F. SLICK



JOHN LLOYD

made assistant general superintendent. A native of Pittsburgh, he joined the Carnegie company in 1899 as a blue print boy at Carrie furnaces. In 1903 he entered the Edgar Thomson works as a draftsman, and on April 1, 1923, he became superintendent of the rolling department.

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FLOYD G. SMITH has been elected president of Van Dorn Iron Works, Cleveland, succeeding **ALFRED J. KROENKE**, who recently resigned as president and general manager. **JAMES T. VAN DORN**, son of T. B. VAN DORN,

former president, has been appointed works manager.

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L. S. HAMAKER, sales production manager, Republic Steel Corp., Youngstown, addressed the Detroit Adcraft Club, Oct. 6, the subject being "Advertising Dons Overalls."

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R. S. FOX, formerly with the Cleveland Cliffs Iron Co., and **JOHN DAKER**, formerly with the Semet-Solvay Co., in Cleveland, have formed a partnership under the name of R. S. Fox & Co., as brokers in pig iron, coke and alloys and have opened offices at 608 Keith Building.

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MALCOLM C. KNEELAND, formerly assistant manager of the Lincoln plant, United Engineering & Foundry Co., Pittsburgh, has joined the Pittsburgh Steel Foundry Corp., Glassport, Pa., as manager of iron roll production. He was with the United company in its Lincoln plant from 1913 until 1931, when this plant was consolidated with the Canton, Ohio, works of the company.

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H. R. JONES has resigned from the presidency of the Ohio Ferro Alloys Corp., and has joined the staff of the Youngstown Sheet & Tube Co.'s newly formed alloy division.

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J. E. MALONEY has been appointed in charge of frame and heavy stamping sales by the Murray Corp. of America, Detroit. For 11 years he was general sales manager of the Midland Steel Products Co., Cleveland, and previously was with the Hydraulic Pressed Steel Co., Cleveland.

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J. F. G. MILLER, formerly vice-president and treasurer of the American Blower Corp., Detroit, has been made vice-president of the B. F. Sturtevant Co., Boston.

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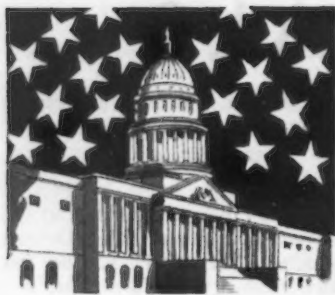
W. R. BEAN, of the Whiting Corp., Harvey, Ill., served as adviser to the Industrial Advisory Board to NRA at the hearing on the code of fair competition covering the malleable iron industry in Washington, Oct. 2.

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C. H. ROSE, assistant treasurer, Youngstown Sheet & Tube Co., Youngstown, Ohio, has been appointed to serve also as assistant-secretary of that company.

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J. W. DAVIS, Cleveland manager for Synthane Corp., Oaks, Pa., maker of laminated bakelite, is now located at 1213 West Third Street, Cleveland.



▲ ▲ ▲ THIS WEEK IN WASHINGTON ▲ ▲ ▲

Administration's Pressure May Bring Captive Mine Armistice

*Apprehension Felt That This is Entering Wedge
Toward Unionization of Steel Industry*

WASHINGTON, Oct. 10.—With events moving as rapidly as they are, tomorrow's situation may be entirely different from today's, especially in the muddled captive mine situation. At this writing (Tuesday) it appears that an enforced armistice may be in sight as a result of a conference being held here today between Thomas Moses, president of the H. C. Frick Coke Co., and United Mine Workers' officials.

The word "enforced" is used advisedly, since apprehension is felt by steel producers that if Washington carries out the threat to force the "closed shop," with all that it implies upon the coal mining section of the steel industry, union labor's next move may be to stop the flow of coal to all steel mills to force union recognition throughout the industry as a whole. The adoption of the "check off" or company deduction of union dues from pay envelopes is particularly repugnant to the industry which deems it an admission on the part of union officials of inability to maintain membership in the national union except by holding this powerful club over workers' heads.

This far the Frick strikers have refused to heed the President's request that they return to work. Workers of the Bethlehem Mines Corp., however, are said to be willing to do so.

Employees of the Weirton Steel Co. who have been on strike for the past week are returning to the mills at Weirton, W. Va., and at Steubenville, Ohio. Several thousand of the 10,000 strikers are said to have al-

By L. W. MOFFETT

Resident Washington Editor
THE IRON AGE

ready returned today, which is the first day that the mill gates have been opened since the walkout.

Executives Opposed to "Check-Off"

The two long White House conferences last Saturday between President Roosevelt and steel executives resolved itself into a question of the check-off at captive mines. The steel executives are distinctly opposed to the system.

Steel executives who the week previous entered into an agreement with President Roosevelt to accept the same working conditions as prevailed in independent coal mines under the bituminous coal code did not construe "working conditions" to include the check-off system, reluctantly accepted as was union recognition by heretofore non-union coal operators. Steel executives construed the agreement to mean payment of the same wages and application of the same hours as those provided in the code, to which the captive mines belong. Actually, it is understood that wages and working hours at captive mines have been more favorable than those previously in union mines.

President Roosevelt, National Recovery Administrator Hugh S. Johnson and United Mine Workers' offi-

cials interpreted the agreement as meaning virtual recognition of the union by captive mine operators.

Nevertheless, the position of the steel executives was supported by an interpretation by Donald Richberg, general counsel for the NRA. Later, Mr. Richberg accepted the union view. At a press conference last Thursday, when he first learned of it, General Johnson said he was "utterly amazed" at the Richberg interpretation. The opposing positions of General Johnson and Mr. Richberg created a temporary stir and set up rumors of a wide open split. But the differences were patched up quickly and General Johnson subsequently said there were no hard feelings between himself and Mr. Richberg.

The upshot of the conferences at the White House Saturday indicated the differences between the steel executives and the President had not been settled. For the President, in a statement, earnestly bent upon settling coal mines strikes both in western Pennsylvania and elsewhere, declared that unless the steel executives negotiated immediately with the workers in captive mines he would determine the question himself and asked both mine owners and workers to accept his decision.

Present at the White House conferences, in addition to the President, were General Johnson and Mr. Richberg and the following steel executives: Myron C. Taylor, chairman, United States Steel Corp.; E. G. Grace, president, Bethlehem Steel Co.; Ernest T. Weir, chairman, National Steel Corp., and George M. Laughlin,

Jr., chairman, Jones & Laughlin Steel Corp.

President Asks Miners to Return to Work

The President appealed to striking workers at captive mines to return to work at once with the assurance that working conditions for them would be substantially the same as those prevailing at independent mines. Simultaneously, it was stated at the White House that steel executives would enter into negotiations "at once and in good faith" with their miners' representatives to settle the disputed points that brought on the strike—the disputed points being recognition of the union and acceptance of the check-off. But in no statement was it said that the union had been recognized, nor that the miners' representatives to be dealt with would be members of the United Mine Workers. In the absence of a definite statement it was the belief that the negotiations were to be taken up with the captive mine workers only with no interference from outside sources.

The White House statement proceeded to declare that if mine owners failed to agree with workers after collective bargaining with representatives chosen by workers, the President would make decisions based "on the principle that captive mines must operate under conditions of work substantially the same in the broadest sense as those which obtain in commercial mines, which represent 90 per cent of coal production."

It was clear that decisions would entail interpretation of the check-off and that the President was prepared to provide Government assistance to support the decisions "in fairness to owners and workers." It was decided that the steel executives were to be informed on or before Monday immediately following the conferences of the President's plan to take negotiations into his own hand in the event of their failure in the meantime.

U. M. W. Alive to Opportunity

That the United Mine Workers had driven fast for recognition was evident from the announcement shortly after the White House conferences by John L. Lewis, president of the United Mine Workers of America, that Vice-President Philip Murray of the union had telegraphed President Thomas Moses of the H. C. Frick Coke Co., that the union was prepared to negotiate an agreement with "captive" coal mine owners under the settlement proposed by President Roosevelt. In the course of the telegram, Mr. Murray told Mr. Moses "mine workers employed at the captive mines have heretofore by resolution duly adopted authorized the international and district officers of the United Mine Workers of America to represent them under the National Recovery Act.

President Roosevelt's plan for set-

tlement carried eight points, and is as follows:

1. That captive mines come under the commercial code except as to provisions relating to coal sale.
2. That workers in every captive mine can choose their own representatives for collective bargaining.
3. That the President would step in if negotiations between operators and miners failed to produce an agreement, and that he would govern his decisions by the conditions already effected for commercial mines.
4. That the President would ask miners and operators to abide by such decisions.
5. That "the President will put into effect such Government assistance as may be necessary to carry out the decisions in fairness to owners and workers."
6. That the settlement would be proposed to the steel men on or before Monday.
7. That the owners had assured the President they would start negotiations at once.

8. That miners should return to work, that the mines should be reopened and "that order be maintained."

The second point in the President's plan was a matter of speculation. It was not clear whether he and the steel executives had agreed upon selection of miners' representatives to enter into negotiations, though union officials said the workers had selected representatives from the United Mine Workers of America. General Johnson expressed the view that the President's terms were "all the union asked and more."

The explanation made by Mr. Richberg over interpretation of union contracts made between commercial mines and the United Mine Workers of America was that the general contract made with the hitherto non-union Appalachian field carried no provision for the check-off. For this reason he had told steel executives that the check-off was not involved. However, he learned later that supplemental district contracts in Western Pennsylvania do include provision for the check-off.

No More "Off Sizes" or Seconds Under Crucible Industry's Code

WASHINGTON, Oct. 10.—One of the shortest on record, the hearing on the code of fair competition for the plumbago crucible industry last Wednesday before Assistant Deputy Administrator Brady came to an end after 25 minutes. It was speeded by reported 100 per cent unanimity among manufacturers.

F. L. Arensberg, president of the Vesuvius Crucible Co., who presented the code on behalf of the Crucible Manufacturers' Association, said that whereas the crucible industry in 1928 had an invested capital of \$3,738,000 and sales of \$2,600,000, representing 70c in sales per dollar of invested capital, this figure had dropped in 1932 to 23c per dollar invested. No company, he said, was able to report earnings in that year.

Because of the continuing nature of the industry, Mr. Arensberg stated, slight variations from the basic maximum work week of 40 hr. and the minimum hourly wage of 40c. provided by the code were found necessary. He said that members of the Crucible Manufacturers' Association were responsible for 95 per cent of the total volume of business done by the industry and that even non-member firms had approved the code's proposed fair trade practices. Chief of these is the prohibition of sales of "seconds" or "off-size" crucibles. This provision, Mr. Arensberg said, not

only would insure a supply of quality products, but also would benefit labor by providing for more new manufacture.

After he presented the code, Mr. Arensberg offered an amendment which would include the production of graphite. In reply to a question by Deputy Brady, J. H. Schermerhorn of the NRA Industrial Advisory Board said members of the Crucible Manufacturers Association consume approximately 75 per cent of all natural graphite produced in America. He added that there are no seeming objections to having that production regulated under the present code.

Mr. Hodges, representing the Bay State Crucible Co., asked permission to dispose of the company's present "on-hand" stocks which are not more than 5 per cent "off" present standard sizes. He said that his company is now conforming to standard set down by the association and that inability to dispose of present holdings would work undue hardship.

Stating that labor provisions of the code must remain open because of the absence of the NRA Labor Adviser assigned to the hearing, Deputy Brady expressed hope that a completed code acceptable for signature by the President could be developed shortly. He added that if the NRA policy continues, the "merit" clause would have to come out of the code.

Government's Pressure on Rail Prices Alarms Capital Goods Industries

Conflict Seen With Underlying Principle of Recovery Plan, Which is to Raise Prices and Wages and Restore Profits and Employment

WASHINGTON, Oct. 12. — Coming at a time when a Government sponsored program is under way for the movement of capital goods in an added effort to lift the country from the depression, more than ordinary significance is given to the statement announced last Friday by Federal Coordinator of Transportation Joseph B. Eastman regarding railroad purchases. The Eastman statement is addressed to the carriers' regional coordinating committees and comes from the Section of Purchases, one of the sections of his organizations. This section is studying the elimination of avoidable waste in the purchase and application of railroad materials, equipment and supplies. It recommends action with respect to the standardization of cars, rails, rail accessories and lumber, adoption of a simplified invoice form and improvement in coal-purchasing methods.

Mr. Eastman points out that there is nothing new or novel about the program, for it has been carried into successful practice by many industries, including the railroads to a very substantial extent. Nevertheless, he expresses the view that the time is now ripe for the consummation of the projects with the possible exception of standardization of rail joints and other accessories, where, it is stated, "serious patent difficulties will be encountered." He says that the railroads individually and through the American Railway Association have made much progress in standardization, notably in connection with equipment which must be interchangeable in use.

"A very large field still remains, however, for saving money through reduction in variety of types, dimensions, specifications, and other factors of many items of supplies, material, and equipment," he declares. "Individual roads can do and have done much in this direction, but plainly maximum economy is dependent on collective action of all of the roads."

Whatever standards are adopted, Mr. Eastman says, means must be provided whereby they will be reviewed at regular periods, and modified or revised when good cause is shown.

The Section of Purchases, it is pointed out, does not claim to have originated these projects. They are all matters on which work has been done before the Section entered the field by railroad and other organizations, it is explained, and in one instance by the Interstate Commerce Commission, of which Mr. Eastman is a member. The Section of Purchases, he says, has met with hearty cooperation from the American Railway Association, the American Railway Engineering Association, the interested departments of the individual railroads and the railroad equipment and supply trade. It is the view of Mr. Eastman that certain projects now appear to be far enough advanced to warrant referring them formally to the regional coordinating committees for action.

Railroads Not Eager For Collective Buying

The question has arisen as to whether this means collective action may be assured from the railroads toward large-scale purchases of cars, accessories, locomotives, etc., to be used as a vital stimulant for the lagging NRA program. The conception may be rather far-fetched, and it is certain that many railroads are extremely reluctant to commit themselves for such purchases. For the most part many lines point to surpluses of cars and even of locomotives which would make impractical the purchase of such equipment, though the response is made by those urging purchasing that much of the equipment is in a bad state of repair or obsolete and consequently a financial handicap rather than an asset. The Eastman statement came on the heels of an unverified report of a plan for the purchase of 100,000 freight cars.

Many railroads also are not enthusiastic over turning to Government funds to finance the projects because of the increased control of their properties and organizations afforded to the Government. However, it is said the Government has rather definite assurance of purchases by railroads if satisfactory financing terms can be given by the Government. That it has given some assurance in what is believed to be the first specific step

toward capital goods movement is indicated by proposed rail purchase plan to be financed largely by the Public Works Administration fund.

In this case, however, at least one railroad, the Pennsylvania, made clear that it is willing to purchase 100,000 tons of rails but desires to place its own orders and does not stipulate price reductions. The independent attitude of the Pennsylvania is held to reflect the attitude that railroads generally would like to assume though many are not in a position to do so. Certain lines, as Mr. Eastman shows in his letter of Oct. 4 addressed to steel railmakers, make it a condition of purchase that the base price of rails shall not exceed \$35 per ton. The "condition" is most important. Mr. Eastman proceeds to say that "The available information warrants a conclusion that the base prices to be submitted should be below rather than above \$35 per ton." He then follows this rather disconcerting observation with another that possibly is even more disturbing when he suggests that government accountants be allowed to examine books and records of steel companies if his conclusion as to the price is challenged. This form of "Government-business partnership" hardly is relished.

Government's Rail Price Policy Discouraging to Capital Goods Industries

And it is the idea of forcing down steel prices generally that is seen as a possible obstacle to a capital goods purchase program, coupled with an attitude of reluctance on the part at least of the railroads. Some carriers also appear to think they will be asked to reduce rates. The resistance to prices and demand for sharp slashes on a highly-finished, closely specified product like rails appears strange when it is considered that the \$40, per gross ton, mill, figure works back to 1.79c. per pound as compared with the steel bar price of 1.75c., Pittsburgh. At \$35 per gross ton it works back to 1.562c., or \$31.24 per net ton, \$3.76 less than the steel bar price. Recognition, however, is given to the fact that volume production is a factor to be given important consideration. For

Recommendations for Standardization by Federal Transportation Coordinator Eastman

RAILS SECTION: Outlined in letter on rail purchase plan addressed to steel executives Oct. 4. Briefly, proposes not more than five standard weights of rails, two agreed upon by Rail Committee, one for 131-lb. section and other for 112-lb. section. All standard weights to be rolled in only one section. Urges quick adoption by railroads.

Rail Joints and Other Rail Attachments and Accessories: Urges vigorous prosecution of standardization work under consideration by subcommittee of Rail Committee, composed of members of American Railway Engineering Association and American Railway Association. Promises aid of Section of Purchases in arriving at solution designed to eliminating waste cause by diversity in these products, not only in first cost but also in handling, storage, accounting and maintenance. Realizes serious complication exists in large number of patents covering various features of this material. Cross-licensing of patents, as practiced successfully in many industries, said to offer one possible remedy for situation.

Equipment: Car Construction Committee, ARA has completed work on standardization of 50-ton steel single-sheathed box car and sample cars of proposed standard being inspected and tested. Some committee work already done on similar standardization of hopper, gondola, refrigerator and tank cars. Urges work to be vigorously pressed to completion.

every ton of rails about \$20 is spent for track accessories.

Yet if rail prices are to be sharply slashed, why not the prices of all steel, of all other products, whether purchases are or are not sponsored by the Government? The precedent is set. It strikes directly at the underlying principle of the NRA to raise prices, to bring industry a profit so it can reemploy idle men and thus restore purchasing power. It conflicts with the fundamentals of the Recovery program. It stands in striking contrast to the organization last week of still another Government corporation, this one to lend 10c. a pound on cotton as a move to raise prices to a given level, then peg and hold them. The thing often has been attempted. It never has been accomplished. Its broad implication of Government control of all industry in a sweeping plan to establish price-fixing is so vast that it is hardly comprehensible. Certainly an outstanding feature would be attempted Government control of production. The Government, however, says no such a wide move is in prospect and there is only a minority of thought that it will expand to that point. But the trend of the move, when considered with efforts to get reduced prices on rails, when the AAA attacks the NRA "stop-loss" clause in the retail code, when codes will have to be discarded if price set-ups are to be ignored, is confusing to say the least.

There are many other elements

working their way into the Recovery program that provide perplexity and the fear is increasingly growing that it is becoming so top heavy that what momentum it has gained will be halted unless some of the ballast is thrown overboard.

The labor situation obviously has become acute and it is realized that unless it is cleared up soon the program cannot succeed.

It will be seen that as the Recovery program enters more deeply into the matter of administration its problems become more complex, with labor and prices the highlights. It is perhaps the general view that labor has made excessive demands, especially in the way of insistence upon recognition of organized labor. Nevertheless, it is generally realized that labor, whether organized or not, has made some just complaints over the operation of some codes, and that employers are in reality responsible for resulting strikes preceding or following such complaints.

One practice complained of, reflected in many cases before the NRA, is that of employers discharging the better paid, long-experienced workman, and then reengaging him at the minimum wage levels of the code. This practice is said to be especially common in certain industries. In some lines where girls are employed they are engaged at code wages, later told their work is "unsatisfactory" but informed they could continue on the

payroll as "apprentices" who are paid piece rates that are absurdly low. Meanwhile prices are kited. This situation is made possible, it is contended, by serious oversight in the Recovery Act provisions which permit codes to set up minimum wages without calling for increases above the minimum. The charge is made that the upshot is that there is a growing number of wage chisellers just as previously there were growing numbers of price chisellers.

Tentative Commitments of Railroads
for Rails and Track Work

Name of Railroad	Rail, Tons	Track- work, Tons
Atchison, Topeka & Santa Fe	50,000	15,000
Atlantic Coast Line	10,000	3,000
Baltimore and Ohio, C. of N. J.—Reading—Alton	50,000	15,000
Boston & Maine—Maine Central	40,000	12,000
Bangor & Aroostook	3,500	1,050
Clinchfield	3,000	900
Chicago and Northwestern	65,000	14,364
Chicago Great Western	12,000	3,600
Central Vermont	5,000	1,500
Chicago & W. Ind.—Belt Ry. of Chicago	3,000	900
Gotton Belt	9,000	2,700
Chicago, Burlington & Quincy	25,000	3,000
Chicago & Illinois Midland	1,750	525
Chicago, Rock Island & Pacific	20,000	6,000
Delaware and Hudson	5,000	1,500
Delaware, Lackawanna & Western	12,000	3,600
Denver and Rio Grande Western	10,000	3,000
Erie	30,000	9,000
Gulf, Mobile & Northern	5,000	1,500
Illinois Central	20,000	6,000
Louisiana and Arkansas	12,000	3,600
Lehigh and New England	3,285	985
Louisville & Nashville	25,000	7,500
Missouri-Kansas-Texas	4,500	1,350
Monon	3,000	900
Mobile & Ohio	3,000	900
Missouri Pacific—GCL—IGN	25,000	7,500
Milwaukee	50,000	15,000
New York, New Haven & Hartford	20,000	7,500
Nashville, Chattanooga & St. Louis	3,490	1,047
Northern Pacific	10,000	3,000
Norfolk & Western	10,000	3,000
Pennsylvania	100,000	30,000
Richmond, Fredericksburg & Potomac	500	150
St. Louis-San Francisco	26,000	7,800
Seaboard Air Line	17,000	5,100
Southern	50,000	15,000
Soo Line—Wisconsin Central	7,500	2,250
Southern Pacific	25,000	7,500
Tennessee Central	2,500	750
Toledo, Peoria & Western	5,000	1,500
Texas & Pacific	500	150
Union Pacific	25,000	7,500
Western Maryland	4,000	1,200
Western Pacific	20,000	6,000
Wabash	10,000	3,000
Central of Georgia	3,000	900
Total	844,525	245,221
Grand total	1,089,746	

Master Code of Fabricated Metal Products Federation Receives Hearing

Code Drafters Insist on Merit Clause and Ask for Explicit Definition of Employer-Employee Rights

WASHINGTON, Oct. 10.—Designed to expedite NRA work and to avoid confusion and expense of operating under several codes, the master code of fair competition presented by the Fabricated Metal Products Federation by Secretary-Treasurer H. S. Kimball, at a hearing last Thursday, before Deputy Administrator H. O. King, was declared to be the voluntary act of 110 trade association members comprising over 2600 concerns and 565 individual company members. It covers the fabricated metal products manufacturing, finishing and coating industry, spreading over a widely diversified field of both large and small plants throughout the country. Mr. Kimball explained that a form of supplementary code has been prepared and is ready for use by all trade associations or trade groups in which the form and all general clauses are the same. He estimated that 100,000 will find employment under the operation of the Recovery Act.

He stated that the industry "has gone as far as possible" in making concessions and will insist upon retention in the code of the "merit" clause respecting labor. This clause, the target for sharp attacks by labor representatives, has been eliminated consistently from each code presented subsequent to that of the automobile manufacturers. Administrator Hugh S. Johnson has said that in an "unguarded moment" he allowed it to get into the automobile code and stated that its incorporation in other codes would be absolutely prohibited.

Employment Increased 53 Per Cent

From Government sources, Mr. Kimball estimated that during the period from 1926 to 1929, there were employed in the manufacturing plants under the code some 350,000 to 400,000. The number for 1932 was about 248,000, while for the spring of 1933 it was approximately 204,000.

Secretary Kimball said that some 60 representative businesses supplied figures on which he based facts as to what a cross section of the industry has done in carrying out the spirit of the Recovery Act. Using this basis Mr. Kimball said that the number of employees has been increased by 53

per cent since the spring of 1933; the average wage per hour of unskilled workers, to whom minimum rates in the code apply, has been increased 16½ per cent; minimum rates per hour have been increased nearly to the rates for unskilled labor in 1926 and under the code will be further increased to the 1926 rate or higher. The total weekly factory payrolls, it was stated, have been increased 98.9 per cent.

The hours worked, it was explained, have been decreased by 5.7 per cent on the average since July 1, 1933, and must be further reduced some 3.1 per cent on the average to bring them into strict conformity with the code. In addition, it was pointed out, if a maximum of 40-hr. per week is imposed, the actual average hours worked, per individual, per week, will be approximately 10 per cent less than that. If the present rate of production continues, Mr. Kimball said, this will further increase the number of employees required by about 11 per cent or within 5 per cent of the total number employed in 1926. Between April 1 and July 15, this year, it was stated, 46,000 were reemployed by the industry. It was explained that the foregoing changes in the weekly hours of operation, when taken together and applied on total employment in the industry on July 15, this year, restores an additional 44,500 to work. Figures from the 60 representative businesses were said to suggest strongly that an additional 44,500 is an understatement rather than an overstatement of the numbers to be reemployed.

Reduction to 40-hr. per week, Mr. Kimball said, has already resulted in the reemployment of many thousands of employees. With a return to nor-

mal conditions it was stated there is every indication of a very definite shortage of certain classes of labor which would seriously handicap the production necessary to meet the increased demand, especially in the higher brackets, where skilled labor is so essential to the maintenance of production and continued employment in the lower brackets.

Legal Rights of Employer Should Be Stated

Turning to the collective bargaining section of the Recovery Act, Mr. Kimball said that to set forth the legal rights of the employer is fair neither to the employer nor to the employee. He gave the opinion that such a policy leads to honest misunderstandings and promotes such industrial strife as will jeopardize the successful operation of the Recovery Act. He said it is evident that the legal rights of the employer have been left undisturbed by the Recovery Act and furthermore that Section 7 (collective bargaining provision) of the act specifically recognizes such legal rights.

"If a part of the law governing the relations of employer and employee is to be set forth in the code, what justification can there be for omitting therefrom a full and fair statement of all the law covering such relations?" asked Mr. Kimball. "Unless the whole picture is fully and fairly presented in the code so that both the employer and the employee may understand their respective rights; disputes, misunderstandings and industrial disturbances will progressively increase and the successful operation of the act will be jeopardized."

The hourly rates of 35 cents and 30 cents respectively, for males and females, cover workers engaged in the processing of products, and together with the hours of work, and the merit clause, were attacked by labor representatives. They asked that rates of pay be increased, hours shortened and the merit clause eliminated. Unless the hourly rate on July 15, 1929, was less, the foregoing rates are to apply but in no event are they to be less than 30 cents and 25 cents for males and females respectively. Provisions also are made



for beginners and apprentices, while general office workers are put on a schedule scaled from \$15 to \$12 per week, depending on population.

Asks to Exclude Machinery and Parts

D. S. Hunter, chairman of the code committee, proposed an amendment which would exclude machinery and parts for assembly from the code. Another amendment he submitted also would specifically exempt basic products which are included in the steel or other codes approved by the President or pending. Mr. Hunter also proposed an amendment calling for equitable adjustment in all pay schedules of factory employees on or before 15 days after the effective date of the code by employers who have not maintained a rate comparable with adjustments made by other employers.

The code provides that during peak demand employees may be engaged 48-hr. per week, but overtime shall not exceed 32-hr. in any six month period. Mr. Hunter submitted an amendment providing, in effect, that time and one-half pay be allowed for working beyond the excess period of 32-hr.

J. N. Davis, Kansas City, Mo., representing the International Brotherhood of Boilermakers, Iron Ship Builders and Helpers of America, asked for a minimum wage rate of 50 cents an hour for common labor for both men and women. He also protested that the term "processing" is improperly used in the code. Request was made that the classification be clarified to bring certain workers under the pending structural steel code. Likewise, Mr. Davis said there should be a guarantee for piece workers by providing that no employee shall receive less than the pay applicable to his class of work. He asked that the minimum pay for general office workers be fixed at \$15 per week by striking out the differentials based on population. Request also was made for employer penalty for permitting employees to work "excess hours." Suggested minimum hours were 40 or 36 with provision for longer hours in case of emergency, the latter to carry time and one-half pay.

Union Officials Make Customary Objections

Mr. Davis assailed the merit clause. He said that if the right is given an employer to discharge an employee, the employee should have access to the books of his employer to determine whether employees are given the advancement promised in the clause. Other labor representatives made similar or greater demands. American Federation of Labor representatives especially asked for the 5-day, 30-hr. week, 6-hr. day. William P. McGuinn, vice-president, International Association of Bridge and Structural Iron Workers, asked that the code provide that when fabricat-

ed metals reach the erection or installation stage the work is to be done under the terms of construction codes. He said that many firms who had signed the fabricated metals producers code belong under the code of the American Institute of Steel Construction. Deputy King pointed out that the fabricated metals code contains an open clause which automatically takes care of the situation.

Robert A. B. Cook, Boston, counsel for the Association of Tubular and Split Rivet Manufacturers, demanded not only that the merit clause remain

in the code, but that it be strengthened by the addition of an open shop declaration. He said that "skepticism and doubt" over the workability of the recovery program had been built up throughout the country.

"In order to remove this," he stated, "industry must know more clearly exactly what is required of it—there must be a specific statement in the code for the rights of both labor and capital." Unless the rights of employers are explicitly set forth, Mr. Cook said, the court might hold that these rights have been waived.

President Approves Codes But Merit Clause Is Out

WASHINGTON, Oct. 10.—In approving codes of fair competition for 17 industries last Thursday, President Roosevelt struck out the much-disputed merit clause from codes for the boiler manufacturing, the farm equipment and the boot and shoe manufacturing industries.

In striking the clause from the boot and shoe code, the President said:

"Because it is evident that attempts by those submitting codes to interpret Section 7 (A) of the National Industrial Recovery Act have led to confusion and misunderstanding, such interpretation should not be incorporated in codes of fair competition. Therefore Article IV must be eliminated."

Hour and wage provisions of some of the codes approved follow:

Boiler Manufacturing—40-hr. week with tolerance allowed for emergency and construction crews, all excess time to be paid for at the rate of not less than time and one-half for shop work and not less than double time for all repair, renewal and construction or erection work. Minimum wage in labor operations, 34c per hour for the southern territory and 40c. per hour for all other portions of the United States. Minimum wage for office workers and similar employees, \$15 per week, with differentials under that figure for a limited number of office boys and girls; legal rates higher than this minimum to apply in states having minimum wage laws.

Farm Equipment—40-hr. week for factory employees with a tolerance of 10 per cent for maintenance crews and certain other classes and an average 40-hr. week over a six-month period for accounting, clerical, service, sales, express or other delivery employees. Minimum wages for factory workers, 40c per hour in cities of more than 1,000,000 population and surrounding industrial area; 30c per hour in the southern states and in communities in other sections of the

country of less than 15,000 population and 35c in all other territory, women to have the same pay as men when doing the same work. Office workers to receive \$15 per week in cities over 300,000 ranging down to \$12 per week in towns of less than 2500.

Textile Machinery Manufacturing—40-hr. week, except for executives, supervisory staff and outside salesmen, with a tolerance of 48-hr. per week and 8-hr. per day to meet peak demand, time and a half to be paid all work over 8-hr. per day. Minimum wage not less than \$14 per week for accounting, clerical and office employees; 35c per hour for all other employees, except outside helpers and shippers south of the Potomac river, learners during their initial 90 days and watchmen, the excepted classes to receive not less than 30c per hour; and equitable adjustment of wages above these minima so that differentials which now exist between skilled and unskilled workers shall be at least maintained.

Knitting, Braiding and Wire Covering Machine Industries—40-hr. week with a tolerance of 48-hr. in not more than eight weeks in any six-month period to cover emergencies and peak demand; executives, supervisory staff and outside salesmen excepted. Minimum wage for accounting clerical, and office employees not less than \$14 per week; all other employees, except learners and apprentices, not less than 40c per hour; where a state law fixes higher minimum rates these will apply; time and a half for all time in excess of 8-hr. per day; equitable adjustment of wages paid above the minimum to preserve differentials between skilled and unskilled workers.

Robert J. Farrell, Waynesburg, Pa., has been granted patents covering a new type of wire nail. The new punch point nail is claimed to eliminate the more common faults of ordinary nails, and can be produced by a less expensive process.

Robert Gregg Made Head of Tennessee Co.

HERBERT C. RYDING, since 1894 connected with the iron and steel interests now comprehended in the subsidiary companies of the United



ROBERT GREGG

States Steel Corp., and since 1907 with the Tennessee Coal, Iron & Railroad Co., Birmingham, succeeding to the presidency of that company Feb. 1, 1930, retires on Oct. 15, under the United States Steel Corp. pension plan.

The finance committee of the Steel Corporation has recommended that Robert Gregg, now vice-president of the Tennessee Coal, Iron & Railroad Co., be elected to the presidency of that company to succeed Mr. Ryding. Mr. Gregg is 48 years of age, a native of Atlanta, Ga., was educated in the Atlanta public schools and the Georgia School of Technology, and is a graduate of Cornell University. He began his business career in August, 1907, with the Atlantic Steel Co. of Alabama, continuing with that company and its successor, the Atlanta Steel Co., until Aug. 1, 1932, on which date he resigned to accept the vice-presidency of the Tennessee Company. During his extended connection with the Atlanta Steel Co. and later with the Tennessee Company, he has covered in various positions the entire range of operations conducted by the latter company.

September Unfilled Steel Orders Decline

THE unfilled orders of the United States Steel Corp. declined for the third consecutive month to 1,775,740 tons in September, a record low for backlog business. This was a drop of 114,704 tons from the August figure of 1,890,444 tons. The drop in Sep-

tember, however, was not as great as the loss of 129,681 tons during August. The September unfilled tonnage compares with 1,841,002 reached on March 31, 1933, previous low record.

The Steel Corporation's unfilled tonnage at the end of each month since 1930 is shown in the following table:

	1933 Tons	1932 Tons	1931 Tons
January	1,898,644	2,648,150	4,132,351
February	1,854,200	2,545,629	3,965,194
March	1,841,002	2,472,413	3,995,330
April	1,864,574	2,326,926	3,897,729
May	1,929,815	2,177,162	3,620,452
June	2,106,671	2,034,768	3,479,323
July	2,020,125	1,966,302	3,407,816
August	1,890,444	1,969,595	3,169,457
September	1,775,740	1,985,090	3,144,833
October	.....	1,997,040	3,119,432
November	.....	1,968,301	2,933,891
December	.....	1,968,140	2,735,353

Milwaukee Foundry & Equipment Co., 3238 West Pierce Street, Milwaukee, has just completed and is making delivery of a large molding machine to the Buick Motor Co. The unit has a 36-in. cylinder, 3 in. larger than the largest previous design. It is air-operated and is capable of turning out 112 moldings an hour, or almost two a minute, compared with the former average of one a minute.

Last Minute Sales Leads

(Received too late for classification in our Plant Expansion Section)

Fairmount Brewing Co., Westmore Avenue and Quebec Road, Cincinnati, has approved plans for extensions and improvements in present plant, with erection of new five-story and basement addition and one-story unit. New bottling machinery, refrigerating equipment, conveying and other machinery will be installed. Cost about \$175,000 with equipment. Newhouse & Bernham, Inc., 8 South Michigan Avenue, Chicago, Architect.

United States Coast Guard Headquarters, Washington has plans for new hangar, 100 x 100 ft., with repair and reconditioning shop at Winter Island, Salem, Mass., for Air Base No. 7, soon to be removed from Gloucester, Mass., to Salem. Hangar will be designed to accommodate 12 airplanes and will be part of \$250,000 program for new base.

City Council, Cape Girardeau, Mo., is arranging financing for new municipal electric light and power plant. Cost \$685,000 with equipment. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

David Lupton's Sons Co., 2263 East Allegheny Avenue, Philadelphia, manufacturer of steel and metal sash, metal shelving, etc., bankrupt, will be offered at public sale, October 24-27, inclusive, including machine tools, metal-working machinery, small tools, electrical equipment, etc.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until October 18, for 53 portable electric drills (Circular 95).

Bureau of Supplies and Accounts, Navy Department, Washington, has secured appropriation of \$200,000 for tools and machinery for naval air stations in different parts of country and naval aircraft factory at Philadelphia: \$220,000 for tools for repair ships and tenders; \$279,000 for tools for battleships, cruisers and destroyers; \$50,000 for freight-handling equipment at navy yards. Early call for bids is planned.

Associated Machine Tool Dealers to Hold Meeting

THE Associated Machine Tool Dealers will hold their annual conference at Shoreham Hotel, Washington, D. C., Oct. 25 to 27 inclusive. On Oct. 26, there will be a meeting held in the West ballroom of the Shoreham to which all builders and distributors of new machine tools are invited. Addresses will be made by deputy administrator Malcolm Muir, E. A. Muller, president, National Machine Tool Builders' Association, Col. George H. Cherrington and J. Roy Porter.

The purpose of the meeting will be to plan the elimination of some of the recognized evils of the machine tool business, nearly all of which become apparent during sales negotiations or after equipment is delivered to the customer.

All machine tool builders and dealers whether or not members of either association are invited to attend the Oct. 26 meeting.

The hearing of the proposed Code of Fair Competition for the Machine Tool and Equipment Distributing Trade will be held at Hotel Shoreham, at 10 a.m., Oct. 27.

Southeastern Brewing Co., West Thirteenth Street, Chattanooga, Tenn., plans new plant, consisting of several multi-story units for brew-house, bottling works, storage and distribution. Cost over \$200,000 with equipment.

Bates-Ludington Co., Ludington, Mich., Ralph E. Bates, president, has taken over former local plant of Stearns Motor Co., for new works for manufacture of automobile parts and equipment.

Constructing Quartermaster, Bolling Field, D. C., asks bids until October 16, for one 5-ton natural-draft incinerator plant.

Department of Commerce, Division of Purchases and Sales, Washington, asks bids until October 17, for steel radio antenna towers in lots of 80 to 140 (Proposal 25603).

Golden West Brewing Co., Seventh and Kirkham Streets, Oakland, Cal., has purchased 2-acre tract in Hostetter industrial district, Los Angeles, as site for new multi-unit plant, with power house, machine shop and other structures. Cost over \$250,000 with equipment.

Metropolitan District Commission, 20 Somerset Street, Boston, asks bids until October 19, for feed water heater and accessories for Chestnut Hill pumping station No. 1. W. E. Whittaker, secretary.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until October 18, for two 38-ft. buoy boats with 32-hp. gas-oil line propelling engine, complete with "A" derrick and 10-hp. hoisting winch, etc. (Proposal 44668).

Old Dutch Brewing Co. of Wisconsin, 308 Guaranty Building, Milwaukee, has been organized to acquire plant of former Burlington Brewing Co., Burlington, Wis., and will recondition buildings and install new equipment at cost of \$75,000. O. P. Williams, consulting engineer, 1438 North Fifth Street, Milwaukee, is handling project. A. W. Sieglaff is president.

SUMMARY OF THIS WEEK'S BUSINESS

Output Raised to Rush Shipments Against Old Orders, But Backlogs Are Reduced

Ingot Production Rate Two Points Higher at 44 Per Cent—Labor Troubles Approaching Settlement—Railroad Buying More Certain

WITH the iron and steel markets almost entirely devoid of significant developments, the interest of the industry is centered upon Washington. Only the Federal Government can solve most of the problems which seem to impede recovery and the future trend of the steel industry must remain highly uncertain until they are worked out.

SETTLEMENT of the bituminous coal strike in western Pennsylvania is again promised before the end of the week, but the terms of agreement between the steel companies operating their own mines and the United Mine Workers have not yet been announced. Acceptance by the operators of the check-off provision demanded by the miners would amount to virtual recognition of the union, and the steel industry is naturally reluctant to make this concession. It is pointed out that unionization of the steel industry itself might thus be forced easily by the tying up of fuel supply sources.

Labor troubles in the Wheeling district are rapidly being settled and picketing in the Pittsburgh area is less prevalent. At Detroit, continuation of the tool and die makers' strike has forced automobile companies to place their business in outside districts in order to continue preparations for new models.

AS generally anticipated, orders for finished steel products were unusually light in the first week of the new quarter. Further analysis of fourth quarter obligations also indicates that the industry's backlog will be largely exhausted by the end of October. The decline of 114,704 tons in the unfilled orders of the Steel Corporation during September, reducing the figure to 1,775,740 tons, the lowest level on record, further demonstrates the industry's need for business. If the Corporation's obligations may be taken as a criterion, it is evident that the benefits of early summer activity have now been fully utilized and that the support of public works construction and railroad purchases must be rushed if drastic curtailment in production is to be averted.

The Public Works Administration is making efforts to hasten the allocation of funds for construction projects, but the results are being felt by the steel industry only in the form of inquiry. Structural

plate and shape jobs reported for the first time this week will require 49,000 tons of steel, although 25,000 tons of this total is for dams on the Mississippi River, which are by no means ready for bids.

ORDERS for 844,000 tons of rails and 245,000 tons of accessories to be financed by the Public Works Administration are promised if the rail price is reduced at least \$5 a gross ton under the current \$40 level. At \$35 a ton, the rail quotation would be \$10.60 a ton under THE IRON AGE composite price for finished steel and more than \$2 under plates and shapes. But even at prices below cost of production, sufficient tonnage is involved to raise steel production five to ten points over the remainder of the year.

Plans for Federal financing of railroad car and locomotive purchases are said to be under consideration. In the meantime, the Great Northern has inquired for 12 large passenger locomotives and the Baltimore & Ohio is preparing a car repair program. With the exception of the Pennsylvania, none of the major railroads has voiced objection to the Government's efforts to establish lower prices by group purchasing, but the belief is growing that such action is contrary to the spirit of the entire recovery program.

URGENCY for completion of shipments against old third quarter contracts by Oct. 15 has necessitated heavier operations in sheet, strip and wire mills. Tin plate production is also higher with the resumption of output in Wheeling district mills which had been tied up by strikes. This temporary activity has raised ingot production in the Pittsburgh, Chicago, Buffalo and Valley districts, and the average for the entire country has advanced two points to 44 per cent of capacity. This compares with an average rate of 40.89 per cent during September. Only the Cleveland-Lorain district reflects a reduction in output this week. The Ford Motor Co. is preparing to resume steel production at its River Rouge plant and is inquiring for 10,000 tons of basic pig iron.

Stabilization is indicated by the fact that THE IRON AGE composite prices for finished steel and pig iron are unchanged at 2.036c. a lb and \$16.61 a ton, respectively. The scrap composite is slightly lower at \$10.87 a ton. Coke prices have been advanced sharply.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:

	Oct. 10, 1933	Oct. 3, 1933	Sept. 12, 1933	Oct. 10, 1932
No. 2 fdy., Philadelphia.....	\$18.26	\$18.26	\$18.34	\$13.84
No. 2, Valley furnace.....	17.50	17.50	17.50	14.50
No. 2 Southern, Cin'ti.....	18.13	18.13	18.23	13.82
No. 2, Birmingham.....	13.50	13.50	13.50	11.00
No. 2 foundry, Chicago*.....	17.50	17.50	17.50	15.50
Basic, del'd eastern Pa.....	17.76	17.76	17.84	13.50
Basic, Valley furnace.....	17.00	17.00	17.00	13.50
Valley Bessemer, del'd P'gh..	19.76	19.76	19.89	16.89
Malleable, Chicago*.....	17.50	17.50	17.50	15.50
Malleable, Valley.....	17.50	17.50	17.50	14.50
L. S. charcoal, Chicago.....	23.54	23.54	23.67	23.17
Ferromanganese, seab'd car- lots	\$2.00	\$2.00	\$2.00	68.00

*The average switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Finished Steel

Per Lb. to Large Buyers:

	Oct. 10, 1933	Oct. 3, 1933	Sept. 12, 1933	Oct. 10, 1932
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.25	2.25	2.25	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill....	2.35	2.35	2.35	2.30
Sheets, galv., No. 24, P'gh....	2.85	2.85	2.85	2.85
Sheets, galv., No. 24, Chicago dist. mill.....	2.95	2.95	2.95	2.95
Hot-rolled sheets, No. 10, P'gh	1.75	1.75	1.65	1.55
Hot-rolled sheets, No. 10, Chi- cago dist. mill.....	1.85	1.85	1.75	1.65
Wire nails, Pittsburgh.....	2.10	2.10	2.10	1.95
Wire nails, Chicago dist. mill..	2.15	2.15	2.15	2.00
Plain wire, Pittsburgh.....	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill..	2.15	2.15	2.15	2.25
Barbed wire, galv., P'gh.....	2.60	2.60	2.60	2.60
Barbed wire, galv., Chicago dist. mill.....	2.65	2.65	2.65	2.65
Tin plate, 100 lb. box, P'gh...	\$4.65	\$4.65	\$4.65	\$4.75

Rails, Billets, etc.

Per Gross Ton:

	Oct. 10, 1933	Oct. 3, 1933	Sept. 12, 1933	Oct. 10, 1932
Rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$43.00
Light rails at mill.....	32.00	32.00	34.00	32.00
Rerolling billets, Pittsburgh..	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh.....	26.00	26.00	26.00	26.00
Slabs, Pittsburgh.....	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh...	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	37.00
Skelp, grvd. steel, P'gh, lb...	1.60	1.60	1.60	1.60

Scrap

Per Gross Ton:

	Oct. 10, 1933	Oct. 3, 1933	Sept. 12, 1933	Oct. 10, 1932
Heavy melting steel, P'gh....	\$12.75	\$12.75	\$13.00	\$9.75
Heavy melting steel, Phila....	10.25	10.50	11.25	7.25
Heavy melting steel, Ch'go....	9.62 1/2	9.62 1/2	10.00	6.00
Carwheels, Chicago.....	10.00	10.00	10.50	7.00
Carwheels, Philadelphia.....	11.75	12.25	12.75	10.00
No. 1 cast, Pittsburgh.....	11.75	11.75	11.75	10.00
No. 1 cast, Philadelphia.....	11.50	11.50	12.50	9.50
No. 1 cast, Ch'go (net ton)...	10.00	10.00	10.00	6.25
No. 1 RR. wrot., Phila.....	11.00	12.00	12.00	7.50
No. 1 RR. wrot., Ch'go (net)...	8.50	8.50	9.00	4.50

Finished Steel

Per Lb. to Large Buyers:

	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.75	1.75	1.60	1.60
Bars, Chicago.....	1.80	1.80	1.65	1.70
Bars, Cleveland.....	1.80	1.80	1.65	1.65
Bars, New York.....	2.08	2.08	1.95	1.95
Tank plates, Pittsburgh.....	1.70	1.70	1.60	1.60
Tank plates, Chicago.....	1.75	1.75	1.65	1.70
Tank plates, New York.....	1.98	1.98	1.898	1.898
Structural shapes, Pittsburgh	1.70	1.70	1.60	1.60
Structural shapes, Chicago...	1.75	1.75	1.65	1.70
Structural shapes, New York..	1.95 1/4	1.95 1/4	1.86775	1.86775
Cold-finished bars, Pittsburgh..	1.95	1.95	1.95	1.70
Hot-rolled strips, Pittsburgh..	1.75	1.75	1.65	1.45
Cold-rolled strips, Pittsburgh..	2.40	2.40	2.25	1.90

Coke, Connellsville

Per Net Ton at Oven:

	Oct. 10, 1933	Oct. 3, 1933	Sept. 12, 1933	Oct. 10, 1932
Furnace coke, prompt.....	\$3.75	\$2.50	\$2.50	\$1.75
Foundry coke, prompt.....	4.25	3.25	3.25	2.75

Metals

Per Lb. to Large Buyers:

	Cents	Cents	Cents	Cents
Electrolytic copper, refinery..	8.50	8.75	8.75	6.00
Lake copper, New York.....	8.75	9.00	9.00	6.25
Tin (Straits), New York....	48.37 1/2	48.62 1/2	46.00	23.95
Zinc, East St. Louis.....	4.75	4.75	4.65	3.05*
Zinc, New York.....	5.12	5.12	5.02	3.42
Lead, St. Louis.....	4.35	4.35	4.35	3.00
Lead, New York.....	4.50	4.50	4.50	3.15
Antimony (Asiatic), N. Y....	6.87 1/2	7.00	6.75	5.62 1/2

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel

Oct. 10, 1933
One week ago
One month ago
One year ago

2.036c. a Lb.
2.036c.
1.979c.
1.977c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

	HIGH	LOW
1933	2.036c., Oct. 3;	1.867c., Apr. 18
1932	1.977c., Oct. 4;	1.926c., Feb. 2
1931	2.037c., Jan. 13;	1.945c., Dec. 29
1930	2.037c., Jan. 14;	2.018c., Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29
1928	2.286c., Dec. 11;	2.217c., July 17
1927	2.402c., Jan. 4;	2.212c., Nov. 1

Pig Iron

\$16.61 a Gross Ton
16.61
16.71
13.64

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	HIGH	LOW
\$16.71, Aug. 29;	\$13.56; Jan. 3	
14.81, Jan. 5;	13.56, Dec. 6	
15.90, Jan. 6;	14.79, Dec. 15	
18.21, Jan. 7;	15.90, Dec. 16	
18.71, May 14;	18.21, Dec. 17	
18.59, Nov. 27;	17.04, July 24	
19.71, Jan. 4;	17.54, Nov. 1	

Steel Scrap

\$10.87 a Gross Ton
10.96
11.42
7.67

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW
\$12.25, Aug. 8;	\$6.75, Jan. 3	
8.50, Jan. 12;	6.42, July 5	
11.33, Jan. 6;	8.50, Dec. 29	
15.00, Feb. 18;	11.25, Dec. 9	
17.58, Jan. 29;	14.08, Dec. 3	
16.50, Dec. 31;	13.08, July 2	
15.25; Jan. 11;	13.08, Nov. 22	

Output Rises at Pittsburgh as Strikes Appear Settled



Valley Production Also Higher as Deliveries Are Rushed on Old Contracts—Coke Prices Rise Sharply

PITTSBURGH, Oct. 10.—Labor unsettlement at several Pittsburgh and Wheeling district mills has been practically overcome and operating schedules are gradually reaching a more normal gait. With mills endeavoring to complete all third quarter commitments by the general delivery deadline on Oct. 15, operations at some plants have been accelerated. Ingot output in the Pittsburgh district this week is five points higher at 40 per cent. Although the full week's schedule for the Wheeling district cannot be definitely gaged because of lingering strike influences at Weirton, production in that area will probably approximate 55 per cent of capacity. Output in the Valleys and nearby northern Ohio mills is higher at 57 per cent, although completion of rolling against third quarter orders will find most mills in need of tonnage at the close of October.

The lack of specific prospects for additional steel business at the moment is being offset by the expected relief from further hampering effects of strikes in the coal regions. The final obstacle to general peace in the bituminous mines, the settlement of disputes between "captive" coal mine operators and union heads, is expected to be hurdled today or tomorrow. The immediate effects on the steel industry of an armistice in the bituminous strife will provide a more definite knowledge of producing costs and reasonable assurance of regular operating schedules.

Since the beginning of the final quarter new bookings of all classes of steel products have been extremely light. In the light-rolled group, tin plate continues to be the brightest spot. Moderate quantities of tin plate for prompt shipment have been booked at the new price and specifications against old orders are still in satisfactory volume. With the resumption of Wheeling district plants today, tin plate mills will probably be running at about 90 per cent of capacity at the end of the week. Sheet mills are fairly well engaged at about 55 per cent of capacity. Tubular goods are inactive. Present rolling schedules on bars, plates and shapes will not extend beyond the end of October unless new tonnage is booked in the meantime. The prospective rail

purchases of the carriers which are still somewhat indefinite offer the best hope for sustained operations after present order books are thinned out. Recent structural steel awards indicate an expanding volume of private work. New Federal projects are still slow to appear.

Pig Iron

With foundry melt in this district tending lower, interest continues to be at a minimum. Buyers are not inclined to cover beyond their imperative spot requirements. Virtually no forward interest is noticeable. Non-integrated steel makers are still out of the market for basic. Prices are unchanged for fourth quarter.

Bolts, Nuts and Rivets

In the absence of settlement of the bolt and nut code, no change in the present discount list has been made. Current discounts are effective through October for delivery by Nov. 15. New discounts are expected to be announced after Oct. 15, and with increased producing costs already in force, higher net prices are considered likely.

Semi-Finished Steel

Movement of billets, slabs and sheet bars continues to be hampered by strikes. Non-integrated mills are evidently well stocked for October requirements, and very little interest is being displayed in forward needs. Prices continue unchanged for delivery through December.

Bars, Plates and Shapes

While mills are engaged in rolling against third quarter tonnage for delivery by Oct. 15, the present backlogs have not been bolstered by new bookings since Oct. 1. Soft steel bars for the automobile trade were specified freely before the close of last quarter, but automobile makers are slow to indicate their forward needs. Demand for reinforcing steel bars is only fair, with public works projects still involving minor tonnages. Structural steel awards in the past week revealed a surprising amount of coverage on private work in anticipation of the price advance. A good share of

recent contracts covered Federal bridge construction. Rolling of shapes against such orders, under code provisions, is supposed to be completed within four months, although extenuating circumstances surrounding erection would probably merit extension of that delivery period. New structural work is very light. Despite recent Federal pronouncements that P.W.A. releases are being expedited, local structural mills and fabricators still are without much prospective Government work for actual figuring. Plates remain quiet, although some fairly good orders for barge work are in the immediate offing. Some hope is held out that the railroad purchasing program will be extended to include equipment buying, which would naturally stimulate need for plates.

Soft steel bars are quotable at 1.75c., Pittsburgh, and tank plates and structural shapes at 1.70c., Pittsburgh, for delivery through fourth quarter. Billet steel reinforcing bars, in stock lengths quoted by distributors, are posted at 1.80c., Pittsburgh, for the remainder of the year.

Rails and Track Accessories

With most carriers having estimated their rail requirements, totaling about 850,000 tons, under the proposed Federal program, further action will apparently hinge upon the extent of the reduction that will be uncovered in the competitive bidding. Whether bidding on supplementary requirements of track accessories, which are expected to aggregate about 250,000 tons, will be the same as the open competition requested by the Government on rails is not yet known. In the meantime, the market is practically bare of other interest, and only routine orders for limited quantities are reported.

Wire Products

This market is practically stagnant. Fresh business is confined entirely to small lot orders. Mills are obligated under the code to ship all third quarter tonnage by the middle of October, but in some cases they will not be able to complete deliveries by that time. Operating schedules have not been stepped up despite the early deadline, and average production is somewhat lower. Current price schedules remain unchanged for delivery through the quarter.

Sheets

Although mills are supposed to clean up all third quarter commitments by Oct. 15, many sheet makers will find it impossible to fulfill such obligations until a week or ten days later. Operations are consequently being sustained, and the expected resumption of the Weirton mill this week will probably effect a higher average operating rate. New busi-

ness since the bulge in specifications at the close of September has been practically nil. Miscellaneous interest is only fair. Large consumers of sheets covered themselves amply at third quarter prices, and the new quotations will probably not be actually tested until late this quarter. Current prices on automobile sheets will probably not be applied until automobile makers are able to go into production on next year's models.

Tubular Goods

This market continues very quiet. Carload orders for standard pipe are coming in sporadically, while mechanical tubing and boiler tubes are moving slowly. Line pipe is neglected in the absence of major line projects. Oil country goods are inactive.

Cold-Finished Steel Bars

Fourth quarter bookings in the past week declined, and indications for the present week point toward a further recession in demand. Producers continue to quote 1.95c., Pittsburgh, for fourth quarter. Talk of a higher price has subsided, although filing of an advanced quotation before the close of fourth quarter is not considered unlikely, if the usual \$7 a ton differential between hot-rolled and cold-finished bars is to be maintained.

Tin Plate

Expected resumption of operations this week in the mills of one company, which had been closed by strikes, will again bring tin plate operations to approximate capacity. Although specifications are not appearing in as heavy volume as they did last month, releases against contracts are insistent. Mills are therefore not looking for any drastic interruption in the present scale of operations for at least another month. Some fair business has been booked recently at the spot price of \$4.65. Export demand, though devoid of important tonnage, is steady.

Strip Steel

Although mills accepted heavy specifications against old orders for delivery by Oct. 15, the retarding effects of strikes will probably necessitate extension of rolling against these commitments a week or more beyond the delivery deadline. In the meanwhile, minor spot orders at the new prices of 1.75c., Pittsburgh, for hot-rolled, and 2.40c., for cold-rolled, are being taken. Some mills are engaged at about 50 per cent of capacity. A Wheeling district mill, which has been down because of a strike, is expected to resume this week, with a consequent lift in average operations of the strip group to about 55 per cent of capacity.

Coke and Coal

Filing of prices under the coal code augurs sharply higher levels if the

new quotations are accepted. Nominal asking prices for coke for October delivery are already higher. Standard furnace coke has been advanced \$1 a ton to \$3.75, Connellsville. Foundry coke is quoted at \$4.25, Connellsville. Premium brands of foundry coke are 50c. a ton higher at \$5. Fuel markets, however, are bare of offerings, and current quotations are strictly nominal. Consumers continue aloof from the market. Some spot covering on bituminous coal in outside districts has been necessary to tide over consumers whose supplies have been cut off by strikes.

Scrap

Relief from strikes at several Pittsburgh and Wheeling district mills this week is expected to bring early releases against scrap contracts. Most consumers continue to accept deliveries very sparingly. Trading is listless. No important sales of No. 1 heavy melting steel have been reported in this immediate district, and the market on that grade is nominally unchanged at \$12.50 to \$13. Some dealers indicate a willingness to sell limited tonnages of No. 1 steel at \$12.50, believing that they could cover at \$12, but very little scrap is appearing and most sellers are more inclined to withhold tonnage at less than \$13. An offer of \$12, delivered at a nearby mill, failed to attract sellers. Disposition of the Pennsylvania Railroad scrap, on which lists closed recently, has not been made known. Some doubt exists that the scrap was sold. Heavy breakable cast is somewhat easier at \$10.50 to \$11. In the Youngstown district recent sales involved about 5000 tons of No. 1 steel and compressed sheets at around \$12.50, and a limited quantity of blast furnace scrap at \$8.75.

Navy Awards Galvanized Bars

APPROXIMATELY 110 tons each of galvanized medium steel bars for 10 destroyers has been awarded by the Navy Department to the Enterprise Galvanizing Co. and Joseph P. Cattie & Brother.

Wear Resistance in Nitrogen-Hardened Iron

RESISTANCE to wear of nitrogen-hardened cast iron was discussed by J. E. Hurst, Sheepbridge Stokes Centrifugal Castings Co., Ltd., Sheffield, England, in a paper read before the September meeting of the (British) Iron and Steel Institute.

The castings were made into the form of cylinder liners and subjected to test in a gasoline engine in stationary service and also in one in

road service. Comparisons were made with chromium alloy cast iron, centrifugally cast and hardened and tempered, and with centrifugally-cast nickel-chromium cast iron, hardened and tempered. The wear value in miles per 0.001 in. of wear was somewhat smaller under the road tests than under stationary conditions, but at a mileage of 40,000, the ratio of the nitrogen-hardened to the hardened and tempered chromium alloy cast iron was 2.2 to 1. In a short test with ethyl fluid, no effect due to the presence of the ethyl was observed.

German Firm To Build Chinese Steel Plant

THE Chinese Government has finally confirmed the contract to the Gutehoffnungshütte, Oberhausen, Germany, for the construction of an iron and steel plant near Pukow, China. However, instead of 500,000 tons, as originally planned, the plant will produce only 250,000 tons annually—as the coal near Pukow is unsuitable for iron production and must be supplied by the far-distant Kao Kang mines of the An Yua district in Kiangsi. The total cost of the plant will be \$40,000,000, and it is expected to start production in 1937. Construction work will begin in November.

Tin in Steel Lowers Resistance to Shock

SOFT steels containing varying tin contents of 0.05 to 0.063 per cent have been studied by Prof. J. H. Andrew and J. B. Peile, department of metallurgy, Sheffield University, England. They found that the presence of tin up to the maximum content did not injure the resistance of the steel to tensile stress, but even the smallest amount lowers the shock-resisting properties and that if the tin content exceeds 0.2 per cent, the effect is serious. This effect, they say, is much more detrimental if the steels are tempered at a low temperature, or if they are allowed to cool slowly through the range 400 to 200 deg. C. after tempering.

The ill effect of tin on the impact strength can be minimized, they assert, by quenching after a full temper, say, at 620 deg. C. The way the tin influences the steels has not been elucidated. There is a certain amount of indirect evidence, by comparison with nickel-chromium steels and from diffusion experiments, which indicates that thin brittle films of free cementite are formed in the grain boundaries. From purely negative evidence it is suggested that the alpha solid solution of tin in iron is substantially weaker than pure ferrite.

Steel Production Advanced to 48 Per Cent at Chicago

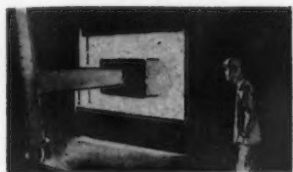


Plate Inquiry Heavy With Public Works Projects Predominant — Action on Rail Buying Program Eagerly Awaited

CHICAGO, Oct. 10.—Ingot output, after having remained stationary for several weeks, has worked to a higher level and now stands at 48 per cent of capacity, a net gain of two points. A steelworks blast furnace has also been lighted. This upward swing is accounted for by the fact that most old contracts are to be executed by Oct. 15 and there is a rush to take commitments. It is possible that the expiration date may be extended.

Automobile manufacturers are taking limited quantities of steel and for the time being the steel industry must carry through without the strong leadership of automotive demand. One of the largest farm equipment makers is announcing a winter manufacturing schedule but this is essentially an effort to help old employees through the winter and not an indication that farmers are entering the market.

Most eagerly sought in the Chicago market are trends that will influence changes in prices and the ultimate outcome of proposed rail programs. Although the Chicago area is not seriously handicapped by labor troubles, there is a growing feeling of unrest, and it is openly stated that the mine unions may be labor's method of approach to force recognition by steel producers throughout the industry. Opinion leans toward unchanged quotations during the remainder of this quarter unless labor disputes advance prices for materials and service which would force sellers of steel to raise selling levels. At the moment the moves being made in coal fields are of special interest to steel producers.

Pig Iron

October shipments are not holding to the September rate and specifications point to a still lower melt. This change is not great but represents a drop when an upswing had been anticipated. New sales are on a moderate scale. Contracting for the quarter is past and most foundries are far better supplied with iron on the ground than has been the case for a year or more.

Coke

By-product foundry coke shipments are tapering as the foundry melt continues its slow but steady downward movement. Prices are unchanged at

\$8 a ton at ovens, effective during the remainder of October.

Reinforcing Bars

Transactions in the Chicago area remain far apart, and fresh inquiries are scarce. Mills have submitted jobber lists to the American Iron and Steel Institute and agreements between producers and jobbers are completed. These agreements set conditions of resale. Objections are being raised to cutting extras for lengths up to 5 ft. and it is probable that these extras will be abolished. Indiana is making additional awards and more bars are to be placed by Wisconsin. Illinois, still lagging, postponed a letting set for Oct. 11 and now announces that bids on a small tonnage will be taken Oct. 16.

Rails and Track Supplies

Fully 20 railroads operating in the Middle West have signified intention to purchase rails. At the moment, the program is at a standstill insofar as actual purchases are concerned. The industry is waiting for the completed plan as is being devised at Washington, which, it is felt, will practically allocate the tonnage. The price question is still unsettled. Small releases are holding Chicago mills to light rollings. Quotations for track accessories are believed not to be involved in the controversy. Several producers of track supplies are buying scrap in anticipation of the business that is to come. One grade of scrap used for this purpose has not moved in this market for almost a year.

Wire Products

Two open-hearth furnaces are being lighted at the Duluth plant of the Steel Corporation. Demand, on the whole, is slightly heavier but does not match output, as shown by the fact that mill stocks are slowly growing. Output for the industry stands close to 50 per cent of capacity. There is some indication that a fall buying movement is under way. New purchases are creeping up while inquiries are decidedly better. Business from farm areas is spotty, and there is not yet a clear understanding of how farmers feel about conditions in general. The automobile industry is in the clean-up stage, but is taking sufficient wire to complete old models in preparation to clearing floors for

new lines for which steel is not yet being shipped in quantity. Producers are giving little thought to prices, although there is talk of advances for the first quarter.

Sheets

More business is still being offered to mills than they can take, although the pressure is less pronounced than a week ago. Current operations are being forced to capacity by specifications that must be shipped before Oct. 15. As that date is near at hand, consideration may be given to an extension of the time limit. Some thought is being given to higher prices for hot mill products.

Plates

Orders total well over 6000 tons and new business in sight accounts for about 30,000 tons. Among the tonnages placed are 2500 tons for refrigerator car underframes and 3000 tons for a gas holder at Omaha, Neb. Bids for another dam on the upper Mississippi River are being taken, and figures on 12 similar projects will be taken before the end of the year, the total steel involved being close to 25,000 tons. The Miller Brewery at Milwaukee is revising its specifications on 800 tons of tank plates and heads. On the whole, the plate market is more active than it has been for many months. A number of old line pipe projects are still under discussion, but none of them appears to have life at this time.

Structural Shapes

New awards, made up for the most part of small lettings, total over 6000 tons, and fresh inquiries, exclusive of the structural shapes needed for dams on the Mississippi River, total 3500 tons. It is clear that shops will have to depend almost wholly on public work for some time to come.

Bars

Producers find this commodity in varying demand, some reporting the market more active, while others find both new buying and specifications on a lower level. Automobile manufacturers, now engaged in a clean-up period between giving up old models and starting on new, are taking small quantities of bars. Industries now actively using bars include spring plants, cold drawers, forgers and makers of railroad equipment.

Scrap

An undercurrent in the market leads many to believe that buying of scrap is soon to develop. The last sale of heavy melting steel was at \$9.75 a ton and it was made at a time when distress tonnage was troublesome. Recently there have been indications of a scarcity of the No. 1 grade, and dealers have been forced to pay \$9.75 to cover old contracts. This has led them to withdraw this price as a quotation to consumers. A foundry has taken railroad cast at \$9.00 and busheling has moved to consumers for first time in months.

New Business Off Sharply in Philadelphia District



**Some Railroad Inquiry Appearing —
Sheet, Tin Plate and Wire Production
Well Maintained—Scrap Prices Lower**

PHILADELPHIA, Oct. 10.—New business has fallen off rather sharply. The letdown had been partially anticipated in view of recent contracting for plates, shapes and merchant bars before the higher fourth levels went into effect. A fair backlog has been built up on this tonnage but unless there is improvement soon in the inflow of additional bookings, operations will show a further recession. It is reported that some business is about to be awarded for railroad car repair work. The Baltimore & Ohio is understood to be asking for bids from car shops in connection with its program which involves a fair-sized tonnage of steel. It is also hoped that steel for public works will begin to reach mill books by the latter part of the present month. The Pennsylvania Railroad has taken no action on bids opened on Sept. 28 and 29 for fourth quarter requirements, estimated to run up to 10,000 tons of miscellaneous steel. Under the code any of this material now ordered would take fourth quarter prices.

Sheet, tin plate and wire mills are operating at a high rate on old contracts. Sheet operations are estimated at about 80 per cent of capacity, which, with the present rate of bookings, can be maintained for about three weeks. Tin plate mills are filled to capacity for most of the remainder of the year, while wire mill operations at the existing rate are assured for about four weeks on manufacturers' wire, for five to six weeks on spring wire and for five to six weeks on fence wire.

Scrap continues to soften, with No. 1 heavy melting steel down to \$10 to \$10.50.

Open-hearth operations are unchanged at 34 per cent of capacity.

Pig Iron

Inquiries and orders range from car lots to 200 tons. Forward buying during the third quarter has left melters with supplies which cover existing requirements, with the result that many of them are out of the market. Strikes have closed beehive ovens in the Connellsville Region and producers are compelled to defer deliveries. Prices of both coal and coke have stiffened, resulting in higher costs to blast furnace operators, but as yet they have not advanced their quotations. Phos-

phorus in malleable iron has just been defined by the pig iron code committee as 0.30 and under, changed from the old specification of 0.20 and under, and is applicable to all districts.

Plates, Shapes and Bars

Recent contracting at third quarter levels has been followed by a lull in new business. Orders for alloy steel bars in September reflected an improvement over August, while orders for carbon bars showed a decline. The Baltimore & Ohio is asking car shop bids on a car repair program said to involve a fair-sized tonnage, which probably will be let soon. The Baldwin Locomotive Works will bid on 12 steam locomotives for the Northern Pacific. The units will be the largest type of trans-continental passenger locomotive. The Phoenix Iron Co. has been awarded 1375 tons of shapes for 10 destroyers. About half of the steel will be galvanized material. Pusey & Jones Co., Wilmington, Del., was low bidder on three coast guard cutters involving about 1500 tons of plates and shapes. Bids were opened yesterday. Bids will be opened in Washington Oct. 25 for nine patrol boats to be built with P. W. A. funds. They will require about 1000 tons of plates and 250 tons of shapes.

Sheets

Operations of black and full-finished sheet mills in this district are at about 80 per cent, while jobbing mills are down to about 25 per cent. Automotive body builders are fairly well stocked and are buying lightly. The radio industry, however, is buying actively, while a decline is noted in demand from stove manufacturers. The Eastern Rolling Mill Co., Baltimore, was awarded approximately 300 tons of sheets for automobile license tags for the State of Maryland. All but one mill, which quoted a higher level, submitted identical quotations for the material, both cold-rolled seconds and annealed pickled sheets, at 2.77c., Baltimore. The Eastern Rolling Mill Co. contract calls for delivery over the first eight months in 1934.

Imports

The following iron and steel imports were received here last week: 5735 tons of pig iron from British India; 33 tons of steel bars and 26

tons of structural shapes from France; 27 tons of structural shapes and 22 tons of steel bands from Belgium; 23 tons of steel bars from Germany; 15 tons of steel tubes, 9 tons of steel billets and 7 tons of steel bars from Sweden, and 1½ tons of ferro-titanium from England.

Scrap

The market has developed further softness, with No. 1 heavy melting steel down to \$10 to \$10.50, and dealers offering the former level. A tonnage of No. 2 heavy melting steel went to a nearby mill at \$8.50. Other grades have shown similar declines.

Pig Iron and Steel Are Dull at Cincinnati

CINCINNATI, Oct. 10.—The pig iron market is quiet. Shipments against commitments are well sustained and in most instances, melters are ordering at contract rate. New business, totaling about 600 tons, represent the urgent needs of consumers. Heavy ordering during August and September has resulted in substantial inventories, making the trade hesitant even toward inquiry. The melt is still low, stove foundries being the only exception to the general inactivity. Prices on Northern and Southern iron are unchanged in the face of market inactivity, with the Southern grade still 38c. below the Northern quotations.

Coke

Except for the regularity of shipments, the coke market is quiet. New business is light, representing current requirements of consumers.

Steel

With automobile manufacturers specifying closely and other users carrying substantial inventories, sheet demand has fallen below 50 per cent of capacity. Backlogs were virtually cleaned up in the past week when rolling schedules exceeded new business by 10 to 15 per cent. Jobbing demand is small, and mills are feeling the heavy ordering of a month ago in the lack of present buying interest. The movement of sheets on old commitments is still good and few hold-ups have been ordered. Uncertainties over prices have diminished and consumers are accepting the new situation without exerting pressure.

Scrap

Weakness in scrap is attracting more material into the market than the rising prices of a month ago. Dealers' bids are unchanged, but nominal, scrap being worth whatever price can be obtained. Current dealings are for application on the few old contracts still uncompleted. Lower mill operations are reflected in lessened interest in new commitments.

Ingot Production Declines in Cleveland-Lorain Area



Orders for Sheets and Strip Are Placed by Automotive Industry—Late Season Activity in Iron Ore Market

CLEVELAND, Oct. 10.—The volume of business in finished steel has been light in the past week. Specifications for bars, plates and shapes held up fairly well against contracts taken at the old prices, and the tonnage of these products entered by some of the mills during the first 10 days of the month was about equal to that ordered in the same period of September. Good orders for sheets and hot and cold-rolled strip steel were placed by general motors units but aside from these very little tonnage came out in flat-rolled material. General Motors is reported to have placed steel for a production schedule of 160,000 Chevrolet and Pontiac cars and trucks during the fourth quarter.

Operations of sheet and strip mills have been well maintained in filling orders issued before Oct. 1, but these orders, except for cold-rolled strip, will be mostly filled by the end of the week and future operations will depend on new releases. With the tapering in the demand, ingot output in the Cleveland-Lorain territory declined five points this week to 40 per cent of capacity, two open-hearth furnaces being taken off by the Otis Steel Co. and one by the Corrigan, McKinney Steel Co.

Producers as yet are getting very little benefit from the new fourth quarter prices. As practically all consumers of bars, plates and shapes covered at the old prices before Oct. 1, the advances will apply on very little tonnage during the current quarter. The new prices have applied to sheets and strip steel purchased by the automotive industry this month, but there is little new business from other sources and not much pickup in the demand is looked for until consumers clean up the present large stocks they accumulated at the old prices.

Pig Iron

Shipments so far this month have not held up to the September volume. With the slowing down of the automotive industry, demand from that source has subsided. New business is light and confined to small orders. One merchant furnace interest sold 2000 tons during the week. Some objection has been voiced to a clause in the iron

and steel code which prevents sellers from closing contracts for the first quarter of next year before December, which it is claimed, does not allow furnaces sufficient time to accumulate a backlog.

Iron Ore

With the close of navigation approaching, some late season demand has developed. A few new open market sales of small lots were made during the past few days, but a fair tonnage was involved, and there have been some new releases against long term contracts. Receipts at Lake Erie ports during September were 4,205,490 tons, and for the season until Oct. 1, 11,959,224 tons, as against 1,793,977 tons during the same period last year. Dock stocks Oct. 1, were 5,033,573 tons, as against 5,241,016 tons on the same date a year ago.

Bars, Plates and Shapes

Activity is confined largely to local public work. Cleveland will take bids Nov. 2 for digester tanks for the Easterly sewage disposal plant, requiring approximately 1000 tons of reinforcing bars. For the same plant 750 tons of bars are about to be awarded. For water main extensions, 5000 tons of steel pipe is still pending and may be divided between two fabricators. Ohio has placed the general contract for the Leavittsburg bridge, requiring 735 tons of structural steel, and will take bids Oct. 20 for two bridges requiring 200 tons. Practically no business has been placed at the fourth quarter prices, which are 1.80c., Cleveland, for bars, and 1.70c., Pittsburgh, for plates and shapes.

Sheets

Considerable tonnage has been placed by some of the General Motors units for their fourth quarter requirements. Otherwise the market is dull. Few consumers have made contracts for the coming quarter. Steel barrel manufacturers are now operating at a very good rate, releases from the oil industry having enabled them to increase production. Barrel makers accumulated heavy stocks of sheets at the old prices but with present opera-

tions these stocks will be cleaned up earlier than expected.

Strip Steel

New business of fair tonnage in both hot and cold-rolled strip was placed during the week by some of the automobile plants for November requirements. Orders from other sources are light, as most consumers have accumulated good stocks. Some of the mills this week will finish shipments of the hot-rolled strip taken at old prices. A few cold strip mills still have a fair backlog. All new business is being taken at 1.75c., Pittsburgh, for hot strip and 2.40c., Cleveland, for cold-rolled strip.

Scrap

The market has settled down to a period of inactivity following the recent purchase of blast furnace scrap by a local consumer. Valley district mills are taking restricted shipments. October scrap lists from motor car manufacturers are smaller than those in September, because of the reduction in production schedules. Prices are unchanged but the market has a weak tone.

Pig Iron Demand Again Quiet at Birmingham

BIRMINGHAM, Oct. 10.—Pig iron selling has returned to a routine basis. No particular change in foundry operations is reported. Stove plants are the most active branch of the industry at this time. Pipe mills have received very little public works tonnage and other current business is small. Jobbing foundry operations are unchanged. Buying of fourth quarter iron is limited. Shipments are not much higher than in September. A number of foundries are drawing on old contracts and this partially explains the backward tendency of fourth quarter sales. The base price of \$13.50 is firm.

Eight furnaces continue in blast, two on basic iron, and six on foundry. Republic Steel changed its No. 1 furnace from basic to foundry iron last week. Birmingham foundry coke has been advanced 25c. a ton, the current price now being \$4.75.

Steel

The usual run of quarterly tonnage is being booked, and this has made the first 10 days of October better than the same period in September. Included in last week's sales were some plates and shapes, which have been quiet recently. The Ensley rail mill operated four days last week but is again idle. Eleven open-hearths were in operation last week and the same number is scheduled this week. No change in number has been made since early September. The requirements of the rail mill were offset by reduced consumption at Fairfield.

Railroad and Construction Buying Awaited at New York



**Lull in Miscellaneous Orders Experienced
in First Week of New Quarter — Spec-
ifications Holding in Fair Volume**

NEW YORK, Oct. 10.—The first week of the new quarter proved to be quiet from the standpoint of new orders for finished steel products. This was in line with the expectations of district sales offices and some of them look for little buying before next month. In the meantime specifications against old contracts have been generally cleaned up and a great many consumers, particularly jobbers and small manufacturers, have sufficient steel on hand to cover their needs for several weeks.

Under the circumstances, public works projects and railroad buying continue to offer the principal hope for fall improvement. An award of 12,500 tons of structural steel for the New York post office addition is expected in a few days. The Port of New York Authority will soon ask for bids on 1800 tons of bolts for the Midtown tunnel. Several other large projects are in prospect but are not yet close to the bidding stage.

Several of the Eastern railroads have submitted their estimated rail and accessory needs to the Federal coordinator. The Pennsylvania has

announced that it will take care of its requirements individually without recourse to price negotiation. Its purchase will likely amount to 100,000 tons of rails and 30,000 tons of accessories. Among other large tonnages required by Eastern carriers are 50,000 tons of rails and 15,000 tons of accessories for the Baltimore & Ohio, 40,000 and 12,000 tons, respectively, by the Boston & Maine, 30,000 and 9000 by the Erie, and 20,000 and 7500 by the New York, New Haven & Hartford. Rail makers are not expected to meet the low price for rails suggested by the Administration and are also likely to resist reductions in quotations on accessories, which are said to be under consideration.

Finished steel prices seem to be generally firm. The new type of contract introduced on fourth quarter purchases of bars, plates and shapes is being extended to other finished steel products as opportunities arise.

Pig Iron

Withdrawal of the freight surtax will not affect delivered prices on pig iron released on contracts made

between Aug. 29 and Oct. 2, according to a recent ruling of the American Iron and Steel Institute. Bookings for the week aggregated 2700 tons, compared with 2800 tons last week and 2400 tons a fortnight ago. Consumers are specifying steadily against contracts, and most old agreements have been completed. Several sellers report complete shipment of small fourth quarter contracts. Despite heavy covering during the third quarter, foundry stocks are dwindling as a result of well maintained melting schedules. The appearance of additional consumer interest during the past two weeks is considered by many sellers to presage a general buying movement arising from the desire of melters to evade possible price advances.

Reinforcing Steel

Distributors are holding more rigidly to published quotations. Bar awards totaled 500 tons, and approximately 1000 tons of road mesh was let during the past week. New York highway contractors have sub-let the major portion of estimated requirements, but increased construction in New Jersey and Connecticut will require additional tonnages. The Manhattan midtown post office tonnage is still pending, and announcement is expected within two weeks concerning the award of 900 tons of bars required by the Grand Island bridges in Niagara County, N. Y.

Scrap

Mills in eastern Pennsylvania and the Pittsburgh district are showing no inclination to resume releases against contracts. Specialties are active in this district, but the major heavy melting grades are devoid of domestic consumer interest. The weakness of outside selling markets is not materially affecting brokers' prices here for No. 1 and No. 2 heavy melting steel because of active purchasing for export accounts. Other grades are weak but nominally unchanged in the absence of significant trading. Brokers are experiencing no difficulty in securing adequate supplies at present price levels, but foreign loadings are being hampered by a boat shortage resulting from heavy grain movements.

Lack of Scrap Buying Weakens Detroit Market

DETROIT, Oct. 10.—With steel mills refraining from making fresh purchases and with dealers having cleaned up practically all current orders, the scrap market is notably weak. However there have been no transactions to test prices which nominally remain at last week's levels. Despite the fact that the Ford Motor Co. is preparing to operate its steel plant again, it offered for sale in the last week a small tonnage of open-hearth scrap.

RYERSON STEEL - SERVICE

Purch. Agent — Keep your shirt on, Pete, we'll keep you in steel.

Prod. Mgr. — Good morning, Charley, you'd better be laying in a good stock of steel soon; the factory sure is eating it up.

Buffalo Steel Output Is Slightly Higher

BUFFALO, Oct. 10.—The Lackawanna plant of the Bethlehem Steel Co., after going down to four open-hearth, has increased this number to six. Republic Steel Corp. is operating five open-hearths, including a large-size furnace. Wickwire-Spencer Corp. is operating two open-hearths and Seneca sheet division of Bethlehem is running at 65 to 70 per cent.

Bids will close this week on a 220-ton State bridge in Steuben County and a 180-ton State bridge in Oswego County. The reinforcing bar business is quiet.

The pig iron business is quiet and shipments have fallen off to some extent. An inquiry for 1000 tons of mixed grades of iron has appeared and a few other inquiries for lesser amounts are out. Users are figuring carefully in order that purchases will not extend beyond the end of the year.

Scrap

The market is inactive with only a few small sales reported. Small lots of stove plate have been sold at \$9.25. The market on this particular commodity is comparatively firm. Due to a shutdown by one of the important users in Buffalo, some stove plate was available for shipment elsewhere. A few sales of No. 1 machinery cast are reported at \$11.50.

Heavy Shape and Bar Inquiries on Coast

SAN FRANCISCO, Oct. 9.—Future construction activity in the Northwest is indicated by the allocation by the Public Works Administrator of \$20,000,000 for a dam and power plant at Bonneville, Ore. In the steel tonnage required will be 3500 tons of structural shapes. The War Department has approved plans for a State bridge across Coos Bay at North Bend, Ore. Estimates call for 3200 tons of reinforcing bars and 3800 tons of structural steel. Bids will be taken for the third time, Oct. 23, at Seattle on the Railway Avenue seawall which will require 3641 tons of structural steel, 1754 tons of reinforcing bars and 770 tons of cast iron pipe.

Several of the new projects added during the week will require major tonnages. About 2500 tons of structural steel will be needed for four cranes for the Navy Yard at Pearl Harbor, Hawaii, and 3150 tons for trash racks for Boulder dam. New structural steel inquiries aggregate 17,163 tons while reinforcing bars totaled 5310 tons.

Bookings were largely for highway work of small tonnages. The only

outstanding award was 3400 tons of eyebars for the Golden Gate Bridge anchorages. Structural steel lettings totalled 4981 tons while reinforcing bars were limited to 534 tons.

Cast Iron Pipe

Ocean Beach, N. Y., asks bids until Oct. 16 for 5650 ft. of 4 to 8-in. for water system; also for 100,000-gal. elevated steel storage tank on 100-ft. steel tower.

Belmont, Cal., plans water system of 4, 6 and 8-in. cast iron and quantity of 2-in. wrought steel pipe. Financing for \$45,000 is being arranged. George A. Kneese, city engineer, Redwood City, Cal.

Round Rock, Tex., plans pipe line for water supply and distribution. Fund of \$39,700 is being arranged. J. W. Beretta, National Bank of Commerce Building, San Antonio, Tex., is consulting engineer.

Minden City, Mich., plans pipe line for water supply and distribution. Financing for \$30,000 has been authorized. Francis Engineering Co., Eddy Building, Saginaw, Mich., is consulting engineer.

Chief of Central Department, Federal District Municipal Government, Mexico, D. F., asks bids until Oct. 20 for about 27,000 meters c.i. pipe for water service. (Open to all pipe manufacturers, foreign as well as domestic.)

Menominee, Wis., has authorized 6-in. line in several streets for water system.

Pe Ell, Wash., plans installation about 15,000 ft. of 4 to 10-in. for water supply.

Tacoma, Wash., has awarded 125 tons of 12-in. to United States Pipe & Foundry Co.

Bremerton, Wash., has awarded 100 tons of 6 to 12-in. to United States Pipe & Foundry Co.

Hamilton Field, Cal., will take bids Oct. 16 on 200 tons.

Beverly Hills, Cal., has taken bids on 110 tons of 6 and 8-in.

Pig Iron Sales Very Light in New England

BOSTON, Oct. 10.—New England foundries continue to take contract iron freely, but new business in the past week was the smallest for any similar period in months. One melter, inquiring for 500 to 1000 tons of No. 2X, failed to act, and there is no other open inquiry in the market. The New England melt has not increased, gains by certain foundries being offset by curtailment at others. The New Hampshire melt has been increased by the activity of a Laconia plant with substantial knitting machinery orders.

The outlook for reinforcing steel bar business is brighter. Local sellers of billet steel bars are doing business at \$1.95 per 100 lb. on cars, Buffalo. For bridge work, Maine has just placed a small tonnage of bars with the Bancroft & Martin Rolling Mills Co., Portland, at 0.0293c. a lb.

Business in scrap is still restricted by the holding up of shipments by Pennsylvania steel mills. Scattered sales of machine shop turnings at \$2.75 to \$3 a ton, on cars, shipping point, were made in the past week, as well as of shafting at \$9.50 and cotton ties at \$5 to \$5.25. Demand for chemical borings has simmered down to regular sources, and the market is easier, \$10 a ton, on cars, shipping point, being the extreme top price. New England foundries are confining purchases of textile and machinery cast to truckloads from nearby or local yards. The supply of such material is rather short.

Purch. Agent. — Pete here is worried because the racks aren't full of steel.

Treas.—I'm glad they're not full. We've been thru three long lean years and must keep our capital liquid for the operation of the business.

RYERSON STEEL - SERVICE

(Continued on next page)

Fabricated Structural Steel

Lettings in Good Volume—New Projects Higher

BOOKINGS of 19,300 tons were equal to those of a week ago, which also totaled 19,300 tons. Most of the tonnage awarded was for public work and included 3400 tons of eyebars for anchorages for the Golden Gate bridge, San Francisco, and 1200 tons for a dam at Chama, N. M. New projects of 48,950 tons compare with 12,800 tons last week and 29,350 tons two weeks ago. Among new jobs reported are 25,000 tons for dams on the upper Mississippi River, 3800 tons for a bridge at North Bend, Ore., over Coos Bay, and 3641 tons for a sea wall at Seattle. Structural steel lettings for the week follow:

NORTH ATLANTIC STATES

State of Maine, 270 tons, highway bridge, to American Bridge Co.

Westchester and Clinton Counties, N. Y., 370 tons, highway bridges, to Lackawanna Steel Construction Corp.

Kew Gardens, N. Y., 130 tons, Long Island Railroad bridge, to American Bridge Co.

St. Lawrence County, N. Y., 170 tons, State bridge, to American Bridge Co.

New York, 160 tons, Sixty-sixth Street building, to Bethlehem Fabricators, Inc.

New York, 325 tons, Swift & Co. warehouse, to Alpha Iron Works.

Greenwich, N. Y., 215 tons, railroad bridge, to American Bridge Co.

Grasselli, N. J., 190 tons, General Aniline Works building, to Belmont Iron Works.

Carneys Point, N. J.—410 tons, E. I. du Pont de Nemours & Co., Inc., addition, to Belmont Iron Works.

Philadelphia, 300 tons, distillery for Publicker Alcohol Co., to Morris-Wheeler Co.

New York, 247 tons, bottling plant at 32 East Thirty-ninth Street, to Post & McCord.

Winthrop, N. Y., 160 tons, State highway bridge, to American Bridge Co.

Edgewater, N. J., 360 tons, sugar bin for National Sugar Refinery Co., to American Bridge Co.

SOUTH AND SOUTHWEST

Port Royal, Va., 420 tons, highway bridge, to Virginia Bridge & Iron Co.

Bowden, W. Va., 140 tons, State highway bridge, to Pittsburgh-Des Moines Steel Co.

Barbersville, W. Va., 400 tons, State highway bridge, to Wheeling Structural Steel Co.

Gonzales and Gregg Counties, Tex., 410 tons, bridges, to Houston Structural Steel Co.

Houston, Tex., 500 tons, grandstand for Texas Breeders & Racing Association, to McClintic-Marshall Corp.

Chama, N. M., 1200 tons, dam, to American Bridge Co.

Pushmataha County, Okla., 425 tons, highway bridge, to Muskogee Iron Works.

Pocahontas County, Ark., 300 tons, State highway bridge, to Pittsburgh-Des Moines Steel Co.

CENTRAL STATES

East Chicago, Ind., 1000 tons, addition to Youngstown Sheet & Tube Co.'s plant, divided between Wisconsin Bridge & Iron Co. and an unnamed bidder.

Chicago, 530 tons, Nurses' Home, to Hanson-Elcock Foundry Co.

Bremer and Fayette Counties, Iowa, 110 tons, bridge spans, to Clinton Bridge Works.

Waupaca and Outagamie Counties, Wis., 380 tons, bridges, to Worden-Allen Co.

Price County, Wis., 350 tons, bridge, to Nausau Iron Works.

State of Wisconsin, 330 tons, Flambeau River bridge, to C. R. Meyer & Sons Co., Oshkosh, Wis.

Peoria, Ill., 450 tons, Allied Mills to Mississippi Valley Structural Steel Co.

Park Falls, Wis., 325 tons, bridge, to Wisconsin Bridge & Iron Co.

Coin, Iowa, 300 tons, bridge, to Pittsburgh-Des Moines Steel Co.

Burlington Railroad, 375 tons, bridges, 125 tons to American Bridge Co., and 250 tons to McClintic-Marshall Corp.

South Bend, Ind., 225 tons, brewery building for Russell Brewing Co., to Edwards Iron Works.

Des Moines County, Iowa, 370 tons, highway bridge, to Pittsburgh-Des Moines Steel Co.

St. Louis, 225 tons, steel shed extension to Wharf No. 12, to an unnamed fabricator.

WESTERN STATES

State of Idaho, 250 tons, highway bridges for United States Department of Agriculture, to Illinois Steel Bridge Co.

Miles City, Mont., 370 tons, highway bridge, to Minneapolis-Moline Power & Implement Co.

Powder River, Mont., 165 tons, bridge, to Minneapolis-Moline Power & Implement Co.

State of California, 265 tons, bridge over Russian River, to Moore Dry Dock Co.

San Francisco, 3400 tons, eye-bars for anchorages for Golden Gate bridge, to Columbia Steel Co.

Santa Barbara, Cal., 1000 tons, pier for Pacific Western Oil Co., to an unnamed importer.

San Francisco, 410 tons, brewery, to Western Iron Works.

Los Angeles, 250 tons, shop building for General Cable Corp., to McClintic-Marshall Corp.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Springfield, Mass., 500 tons, technical high school.

Steuben County, N. Y., 220 tons, State bridge; bids in this week.

Oswego County, N. Y., 180 tons, State bridge; bids in this week.

State of New York, 215 tons, highway bridges in Allegheny and Erie Counties; bids taken Oct. 10.

Erie Railroad, 400 tons, bridges at Elmira, N. Y.; bids taken Oct. 10.

SOUTHWEST

State of Arkansas, 400 tons, highway bridge.

Lake City, Ark., 735 tons, St. Francis River bridge.

CENTRAL STATES

State of Ohio, 735 tons, Leavittsburg bridge; general contract awarded to C. R. Bolton, Columbus.

State of Ohio, 200 tons, Athens and Wyna-dot County bridges; bids Oct. 20.

State of Indiana, 600 tons, highway bridges at Liberty and Noblesville.

State of Wisconsin, 150 tons, Yellow River bridge; bids Oct. 17.

State of Wisconsin, 150 tons, bridge; Worden-Allen Co., low bidder.

State of Minnesota, 250 tons, highway bridge.

Muscatine, Iowa, 1000 tons, dam across Mississippi River.

Upper Mississippi River, 25,000 tons, dams not previously reported; bids to be taken before January.

Joplin, Mo., 250 tons, brewery.

WESTERN STATES

Denver, 3150 tons, trash racks for Boulder Dam; bids Oct. 16.

Custer County, Idaho, 116 tons, Bureau of Public Roads bridge; bids Oct. 13.

Seattle, 3641 tons, Railway Avenue seawall; bids Oct. 23.

Prod. Mgr.—That's all right with me but you know it costs money to hold up production.

Purch. Agent—Yes, I know, and it costs money to carry steel on hand. As soon as it's in, you change the size or specification and the stock is obsolete. We're hooked up with Ryerson for Immediate Service. They have the largest stocks in the country and can get steel over here almost as soon as you can truck it from your storerooms.

RYERSON STEEL - SERVICE

Bonneville, Ore., 3500 tons, dam and power plant.

North Bend, Ore., 3800 tons, State bridge over Coos Bay.

San Francisco, 400 tons, General Brewing Co. building; bids under advisement.

HAWAII

Pearl Harbor, 2500 tons, four cranes for Navy Yard; bids Nov. 15.

FABRICATED PLATE

AWARDS

Lowell, Mass., 300 tons, brewery tanks, to Graver Tank & Mfg. Co.

Ogdensburg, N. Y., 1090 tons, Texas Co. tanks, to Hammond Iron Works.

Philadelphia, 130 tons, brewery tanks, to Downingtown Iron Works, Inc.

Milwaukee, 800 tons, gas holder, to Stacey Brothers Gas Construction Co.

Pasadena, Cal., 175 tons, gates for Pine Canyon dam, to Western Pipe & Steel Co.

NEW PROJECTS

Washington, 4000 tons, gas holder.

Trona, Cal., 390 tons, tanks for American Potash & Chemical Co.; general contract awarded.

Stove Makers Buying Sheets at St. Louis

ST. LOUIS, Oct. 10.—Another change has been made in the delivered price of Southern pig iron, which continues to be 38c. a ton less than Northern iron for foundry grades, but with no differential on basic grades. The placing of Southern and Northern basic on the same delivered basis is believed to be a temporary measure. Sales during the week were mostly small lots for fill-in purposes.

The tonnage placed for fourth quarter by fabricators of structural steel was said to be light, most contracts being made for a percentage of requirements rather than for definite quantities. Jobbers bought very little for stock. Buying of sheets by stove plants is active. Fabricators in the St. Louis industrial district are operating at about 40 per cent of capacity. Opening of bids for the Municipal Auditorium at Kansas City, requiring 6000 tons of structural steel, has been indefinitely postponed from Oct. 4.

Scrap

A district smelter bought 2000 tons of No. 2 heavy melting steel during the week at 25c. a ton less than the last preceding sale of this grade. Dealers have reduced their buying prices accordingly. Cast iron car-wheels also are off 50c. a ton. Railroad offerings have been light. Missouri Pacific has a list of 85 carloads.

The New York Central Railroad intends to increase employment 16 per cent in its various shops during October, according to a recent announcement.

Reinforcing Steel

Awards 2350 Tons—New Projects 6450 Tons

Gloucester, N. J., 175 tons, immigrant station, to Kalman Steel Co.

Hudson and Bergen Counties, N. J., 440 tons, mesh, to Truscon Steel Co.

Hasbrouck Heights, N. J., 145 tons, bars for railroad bridge, to Igoo Brothers.

Bergen County, N. J., 150 tons, bars for highway construction, to Igoo Brothers.

Jefferson County, N. Y., 300 tons, road mesh, to American Steel & Wire Co.

Dutchess County, N. Y., 165 tons, road mesh, to Truscon Steel Co.

State of Indiana, 100 tons, road work, to Concrete Engineering Co.

State of Indiana, 150 tons, highway work, to Highland Iron & Steel Co.

State of Illinois, 200 tons, road work in various counties, to Concrete Engineering Co.

State of California, 100 tons, highway work in five counties, to various bidders.

State of California, 107 tons, bridge over Russian River, to Soule Steel Co.

State of Montana, 178 tons, highway work in five counties, to unnamed bidders.

State of Oregon, 113 tons, highway work in four counties, to unnamed bidders.

NEW REINFORCING BAR PROJECTS

Morris Plains, N. J., 100 tons, bars for bridge; bids Oct. 23.

Cleveland, 1000 tons, digester tanks; bids Nov. 2.

Moffat County, Colo., 100 tons, two State highway projects; general contract awarded.

Denver, 105 tons, Bureau of Reclamation Specification No. A-3316-B; bids under advisement.

Ontario, Ore., 649 tons, linings on Owyhee project; bids Nov. 7.

North Bend, Ore., 2200 tons, state bridge over Coos Bay.

State of Washington, 117 tons, bridges in Walla Walla and Pierce counties; bids Oct. 17.

Seattle, 1754 tons, Railway Avenue seawall; bids Oct. 23.

Riverside County, Cal., 210 tons, siphon in Little Morongo Canyon for Metropolitan Water District; bids Oct. 30.

Santa Barbara County, Cal., 183 tons, State bridge over Gaviota Creek; bids Oct. 25.

Pipe Lines

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 24, for 9700 ft. welded steel pipe for Mare Island Navy Yard, and 1900 ft. wrought iron pipe (Schedule 824).

Natural Gas Pipe Line Co. of America, Inc., 20 North Wacker Drive, Chicago, has secured right-of-way for new welded steel pipe line in Ottumwa and Wapello Counties, Iowa, about 29 miles.

Perry, Okla., will install steel pipe line system for natural gas distribution. Financing for \$72,000 has been arranged.

Construction Quartermaster, Fort Bliss, Texas, plans steel pipe line system for natural gas supply. Cost about \$100,000. Early call for bids is planned.

Northern Natural Gas Co., Rochester, Minn., has authorized steel pipe line system at Farmington, Minn. Cost about \$25,000.

Wyoga Gas & Oil Corp., Williamsport, Pa., is arranging sale of stock to total about \$350,000, part of fund to be used for development of gas-producing properties, pipe lines, etc.

Railroad Equipment

Delaware, Lackawanna & Western has purchased three additional Diesel oil-electric locomotives from Ingersoll-Rand Co., and American Locomotive Co.

United Fruit Co. is inquiring for 20 flat cars for export.

North American Car Co. is inquiring for one 50-ton capacity beer car.

Alaska Railroad ordered 10 ballast cars from Pacific Car & Foundry Co., and 10 dump cars from Magor Car Corp.

Northern Pacific will take bids on 12 passenger locomotives.

Norfolk & Western Railway Co., Roanoke, Va., asks bids until Oct. 18 for 10,000 gross tons steel rail (Contract Serial AA-634).

RYERSON STEEL-SERVICE

stands for immediate shipment of everything
in iron and steel

Following is a partial list of products: — — — — —

Stainless Steel
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Cold Finished Bars
Chrome Nickel & Other
Alloys
Strip Steel
Sheets
Plates
Mild Steel Bars
Structurals

Copper
Brass
Tubes, Boiler & Mechanical
Welding Rod
Bolts
Rivets
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Shall We Send the Ryerson Stock List?

JOSEPH T. RYERSON & SON, INC.

Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit,
Cleveland, Buffalo, Boston, Philadelphia, Jersey City

④

Technical Features of Mechanical Engineers December Meeting

SOME 35 technical sessions in the Engineering Societies Building, New York, on Dec. 5, 6 and 7, will feature the annual meeting of the American Society of Mechanical Engineers. Also as part of the program, on the afternoon and evening of Dec. 7 at the Stevens Institute of Technology, Hoboken, N. J., a celebration will be staged in memory of Frederick W. Taylor, the father of scientific management and the discoverer of high-speed steel. The technical sessions of particular interest to readers of THE IRON AGE include the following:

Machine design and materials handling, with papers by A. H. Mogenssen, *Factory Management and Maintenance*, New York, on motion study and machine design, by Joseph Sinel, industrial designer, New York, on appearance in design, and J. M. Enders, General Electric Co., Schenectady, N. Y., on maintenance of handling equipment.

A materials handling and process session has papers scheduled as follows: Drying methods, by C. W. Thomas, consulting engineer, and Arnold Weisselberg, New York; bulk conveying of chemicals, by Nixon Elmer, engineer Stephenson-Adamson Mfg. Co., Ridgeway, Aurora, Ill.; engineering in the brewery, by Victor Buhr, vice-president, Equity Construction Co., New York.

Milling vs. Planing

A symposium on milling versus planing will include papers by A. C. Danekind, General Electric Co., Schenectady; R. E. W. Harrison, Ingersoll Milling Machine Co., Rockford, Ill., and Forrest Cardullo, chief engineer, G. A. Gray Co., Cincinnati.

A session on metal cutting will present a joint paper by Prof. O. W. Boston and C. E. Kraus, University of Michigan, Ann Arbor, Mich., on performance of cutting fluids in a power hacksaw; and a joint paper by Prof. L. Thomassen and D. M. McCutcheon, University of Michigan, on the X-ray determination of the depth of cold working. This session is scheduled for the morning of Dec. 7, and the Taylor celebration in Hoboken in the afternoon of that day will stage a metal cutting demonstration.

A joint session with the American Foundrymen's Association (afternoon of Dec. 6) will have a paper by James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, on the meaning of the transverse test, and by Everett Chapman, vice-president, Lukenweld, Inc., Coatesville, Pa., on welded joints.

Bearing metals, by J. R. Connelly, Lehigh University, Bethlehem, Pa.,

and mechanical control of metallurgical furnaces, by H. J. Velten, H. A. Brassert Co., Chicago, are papers announced for a session of the iron and steel division of the society (morning of Dec. 7).

Mechanical springs come in for four papers, scheduled for the afternoon of Dec. 7. These are: Stress analysis of a helical spring, by Prof. H. C. Perkins, Cornell University, Ithaca, N. Y.; elastic behavior and creep, by Prof. M. F. Sayre, Union College, Schenectady; fatigue of spring material, by D. J. McAdam, Jr., metallurgist, U. S. Bureau of Standards, Washington, and eccentricity of load, by J. B. Reynolds.

Management and Recovery

Management looms large as usual in the program. On the morning of Dec. 6: What psychology can contribute to the return to stability, by R. Likert, New York University, and labor research in regard to the textile checkout, by Elliott Dunlap Smith, Saybrook College, Yale University, New Haven. On the afternoon of Dec. 6: Problem of the product in industrial recovery, by Willard E. Freeland, industries consultant, Boston, and policies in marketing, by Paul T. Cherington, business consultant, New York.

Closely allied to the management sessions is one (Dec. 7, morning) to be addressed by Col. Malcolm C. Rorty, consulting economist, Lusby, Md., on industrial codes and cooperation. A general discussion, to be opened by Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt., will follow.

Mr. Flanders will address an engineering education session (Dec. 7, afternoon) on what industry wants in the way of economic training of engineering students. Two papers on industrial training will be presented on the morning of Dec. 5, one by Ovid W. Eshbach, American Telephone & Telegraph Co., New York, and the other by Prof. Theodore S. Johnson, North Carolina State College of Agriculture and Engineering, Raleigh, N. C.

Creep of Metals

The creep of metals has been given a session on the afternoon of Dec. 6. This will receive the report of the joint high temperature committee of the mechanical engineers and the American Society for Testing Materials on the 18 and 8 alloy, covering fatigue tests at elevated temperatures. Two papers are also on the program: correlation of creep data, by P. G. McVetty, Westinghouse Re-

search Laboratory, East Pittsburgh, Pa., and variation of elastic modulus of metals with temperature.

There will be three sessions on heat transfer data, two on railroad mechanical engineering problems, including a paper on light-weight cars, by E. E. Adams, vice-president, Pullman Co.; two on central power stations and two on water measurement.

Other sessions are classified as follows: Fuels, applied mechanics, industrial power, lubrication research, fluid meters, oil and gas power, textiles, steam tables, airships, stress analysis, air conditioning and boiler feed water.

The Frederick W. Taylor celebration will include, besides the lathe demonstration, a play in the late afternoon, followed by a supper at which Supreme Court Justice Brandeis will be the speaker.

Blaw-Knox Adds Coppersmithing Shop

BLAW-KNOX CO. has just completed the installation of a coppersmithing shop as an addition to its manufacturing facilities at Blawnox, Pa.

The company is specializing in the fabrication of copper vessels for breweries, distilleries, manufacturers of industrial alcohol, wood alcohol, acetic acid, fatty acids, pharmaceuticals, acetone, formaldehyde, soap, turpentine, varnish, synthetic resins and other products of the process industry, in the manufacture of which copper equipment is utilized.

The fabrication of copper equipment by the Blaw-Knox Co. is a further extension of its present facilities which include fabrication of equipment from steel, alloys, and other metals.

Noranda Mines to Expand Production

TORONTO, Ont.—James Y. Murdoch, president of Noranda Mines, Ltd., states that directors have decided to increase the capacity of the concentrator at Noranda, Quebec, by 1,000 tons daily, bringing it up to 3,000 tons per day. The addition, which will represent an expenditure of \$400,000, is to be completed and in operation by the second quarter of next year. The company also plans to install equipment for retreating of tailings and also proposes to install a 100-ton cyanide test mill for gold treatment. Mr. Murdoch also announced that Ernest Hibbert has been elected to the board of directors to fill the vacancy caused by the death of Judge Phippen.

General Electric Orders Increase

ORDERS received by the General Electric Co. for the third quarter of 1933 amounted to \$43,733,499, compared with \$35,539,858 for the second quarter of this year and with \$25,665,402 for the third quarter of 1932, an increase over last year of 70 per cent, President Gerard Swope announced.

For the nine months ended Sept. 30, orders received this year amounted to \$104,785,001, compared with \$94,374,114 for the first nine months of 1932, an increase of 11 per cent.

Would Have Safety Director Teach English

TEACHING foreign workers in industrial plants how to read and speak English is essential to the successful carrying out of a safety program, according to F. M. Gillies, assistant general superintendent, Indiana Harbor Mill, Inland Steel Co., who addressed the annual Safety Congress and Exposition at Chicago, Oct. 3.

The effect on the foreman who is giving safety instructions to ears that he knows are recording imperfectly is most discouraging, he said. Even with the help of an available interpreter, the second-hand instruction, he asserted, is very often distorted.

He believes that each steel plant should carry on a program to teach the English language to those foreigners who have not mastered it. The classes in English he would turn over to the safety director, and it would be found that personnel for teaching could be readily and economically obtained. Until the learning of English is made compulsory by the steel plant, safety programs and all kinds of instructions, he said, will never be thoroughly developed.

Dust Problem in Industry

THE dust problem in industry was discussed in a special session of the annual Safety Congress, held in Chicago, Oct. 6. One of the formal talks was on "The Mechanical Control of Dust" by E. O. Jones, consultant of the National Founders Association, Chicago.

"During the last few years," said Mr. Jones, "much has been written and published as to the pathological effects of certain kinds of dust. From this material we note that there seems to be some lack of agreement among scientists as to the pathological effects of these certain types of dusts, their dangerous dimensions, the length of time to which one must be exposed to their inhalation, the density of concentration which is dangerous, and

the extent to which they are directly causative or contributory to disease in the human system.

"It is an unfortunate fact that in the twilight zone between ethics and non-ethics there are certain members of the legal and medical profession who are willing to take advantage of these uncertainties in the situation and capitalize on them largely for their own benefits.

"There has been a tendency to hysteria in some of the things which affect the calm consideration of the problem. Various legislative bodies, State industrial boards and other asso-

ciations have lately become very much interested in the subject, and there is no question that they have an honest and humane purpose to inquire into the conditions under which work is performed and to see to it that they are as sanitary, healthy and safe as they can be. But no one must assume that the manufacturer is not as much interested as they are, and with a good reason, or that he is not willing to do his part to the limit. . . . We know from experience that gradually human ingenuity will provide ways and means to solve the problem of controlling dust at its source."



A SOUND SPECIFICATION

*Wherever Exactness To Size,
Straightness, Unvarying
Cross-Sections And Guaranteed
Machining Performance
Are Essential.*

Carbon and Alloy

ROUNDS $\frac{1}{8}$ " to 6" inclusive

SQUARES $\frac{1}{4}$ " to 4" inclusive

HEXAGONS $\frac{1}{4}$ " to 3" inclusive

FLATS $\frac{1}{8}$ " x $\frac{3}{8}$ " to 2" x 6" inclusive

SPECIAL SHAPES AS DESIRED

TURNT AND POLISHED SHAFTING

TURNT AND GROUND SHAFTING

WYCKOFF DRAWN STEEL COMPANY

GENERAL OFFICES—Ambridge, Penna.

MILLS—Ambridge, Penna. and Chicago, Ill.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars Soft Steel	
Base per Lb.	
F.o.b. Pittsburgh mill	1.75c.
F.o.b. Chicago or Gary	1.80c.
Del'd Philadelphia	2.04c.
Del'd New York	2.08c.
F.o.b. Cleveland	1.80c.
F.o.b. Buffalo	1.85c.
F.o.b. Birmingham	1.90c.
F.o.b. cars dock Pacific	2.30c.
F.o.b. cars dock Gulf ports	2.15c.
Rail Steel	
(For merchant trade)	
F.o.b. Cleveland	1.70c.
F.o.b. Chicago	1.70c.
F.o.b. Gary	1.70c.
F.o.b. Pittsburgh	1.65c.
F.o.b. Buffalo	1.75c.
F.o.b. Birmingham	1.80c.

Billet Steel Reinforcing	
(Stock lengths as quoted by distributors; cutting to length, 60 in. and over takes extra of 10c. per 100 lb.)	
F.o.b. P'h mills	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. Buffalo	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Youngstown	1.85c.
F.o.b. Chicago or Gary	1.85c.
F.o.b. cars dock Pacific ports	2.35c.
F.o.b. cars dock Gulf ports	2.20c.

Rail Steel Reinforcing	
(Cut lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.75c.
F.o.b. Cleveland	1.80c.
F.o.b. Chicago	1.80c.

Iron	
Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'h mills	2.75c.
Common iron, del'd Phila.	1.74c.
Common iron del'd New York	1.90c.

Steel Car Axles	
F.o.b. Pittsburgh	2.50c.
F.o.b. Chicago	2.50c.

Tank Plates	
Base per Lb.	
F.o.b. Pittsburgh mill	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Birmingham	1.75c.
F.o.b. Buffalo	1.80c.
Del'd Cleveland	1.85c.
Del'd Philadelphia	1.85c.
F.o.b. Coatesville	1.80c.
F.o.b. Sparrows Point	1.80c.
Del'd New York	1.95c.
F.o.b. cars dock Pacific	2.25c.
F.o.b. cars dock Gulf ports	2.10c.
Wrought iron plates, f.o.b. P'h.	3.00c.

Floor Plates	
F.o.b. Pittsburgh	3.20c.
F.o.b. Chicago	3.25c.

Structural Shapes	
Base per Lb.	
F.o.b. Pittsburgh mill	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.
F.o.b. Buffalo	1.80c.
F.o.b. Bethlehem	1.80c.
Del'd Cleveland	1.85c.
Del'd Philadelphia	1.90c.
Del'd New York	1.95c.
F.o.b. cars dock, Gulf ports (stand- ard)	2.10c.
F.o.b. cars dock Pacific ports (wide flange)	2.25c.

Steel Sheet Piling	
Base per Lb.	
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.00c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars	
F.o.b. Pittsburgh, Chicago, Buffalo, Beth- lehem, Massillon or Canton. Open-hearth grade, base, 2.45c. a lb. ex- cept at Bethlehem where the price is 2.55c. S.A.E.	
Numbers	
2000 (1/4% Nickel)	\$0.25
2100 (2 1/4% Nickel)	0.55
2300 (3 1/4% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is 1/4c. per lb. higher with separate extras. Blooms,

billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Cold Finished Bars*	
Bars, f.o.b. Pittsburgh mill	1.95c.
Bars, f.o.b. Chicago	2c.
Bars, Cleveland	2c.
Bars, Buffalo	2.15c.
Bars, Detroit	2.15c.
Bars, eastern Michigan	2.20c.
Shafting, ground, f.o.b. mill	1 1/4 in. 3.25c. 1-3/16 to 1 1/2 in. 2.75c. 1-9/16 to 1 3/4 in. 2.60c. 1-15/16 to 2 1/4 in. 2.45c. 2-15/16 to 6 in. 2.30c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets	
Hot Rolled	
No. 10, f.o.b. Pittsburgh	1.75c.
No. 10, f.o.b. Gary	1.85c.
No. 10, del'd Phila.	2.04c.
No. 10, f.o.b. Birmingham	1.90c.
No. 10, f.o.b. dock cars Pacific	2.42 1/2 c.
Hot-Rolled Annealed	
No. 24, f.o.b. Pittsburgh	2.25c.
No. 24, f.o.b. Gary	2.35c.
No. 24, del'd Phila.	2.54c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, f.o.b. dock cars Pacific	2.95c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled	
No. 10 gage, f.o.b. Pittsburgh	2.30c.
No. 10 gage, f.o.b. Gary	2.40c.
No. 10 gage, del'd Phila.	2.59c.
No. 10 gage, f.o.b. dock cars Pacific	3.00c.

Light Cold-Rolled	
No. 20 gage, f.o.b. Pittsburgh	2.75c.
No. 20 gage, f.o.b. Gary	2.85c.
No. 20 gage, del'd Phila.	3.04c.
No. 20 gage, f.o.b. dock cars Pacific	4.45c.

Galvanized Sheets	
No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Gary	2.95c.
No. 24, del'd Phila.	3.14c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, f.o.b. dock cars Pacific	3.55c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Terme	
No. 24, unassorted 8-lb. coating	2.90c.

Vitreous Enameling Stock	
No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate	
No. 28, f.o.b. Pittsburgh	2.50c.
No. 28, Gary	2.60c.

Tin Plate	
Base per Box	
Standard cokes, f.o.b. P'h district mill	\$4.65
Standard cokes, f.o.b. Gary	4.75

Terne Plate	
(F.o.b. Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C.	\$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.	
Base per Lb.	
All widths up to 24 in. P'h.	1.75c.
All widths up to 24 in. Chicago	1.85c.
Cooperage stock, Pittsburgh	1.85c.
Cooperage stock, Chicago	1.95c.

Cold-Rolled Strips	
F.o.b. Pittsburgh	2.40c.
F.o.b. Cleveland	2.40c.
Del'd Chicago	2.68c.
F.o.b. Worcester	2.60c.

Fender Stock	
No. 20, Pittsburgh or Cleveland	3.10c.

WIRE PRODUCTS

To Manufacturing Trade	
Per Lb.	
Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade
Extras of 10c. a 100 lb. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. An allowance of \$2 a ton is made to jobbers on straight, mixed or joint carloads; \$3 a ton is allowed on less-than-carload shipments.

Standard wire nails	
Smooth coated nails	\$2.10
Galvanized nails	2.60

Base per 100 Lb.	
Smooth annealed wire	\$2.25
Smooth galvanized wire	2.60
Polished staples	2.80
Galvanized staples	3.05
Barbed wire, galvanized	2.60
Woven wire fence, base column	55.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are \$2 a ton over Pittsburgh (except for woven wire fence at Duluth which is \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe	
Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills	

Butt Weld	
Steel	
Inches	Black Galv.
1/4	51 1/4 29 1/4
1/2	57 38 1/4
3/4	62 50 1/4
1	65 1/4 55 1/4
1 1/2	67 1/4 58 1/4
Wrought Iron	
Inches	Black Galv.
1/4	51 1/4 +138
1/2	57 38 1/4 +11 1/2 +21 1/2
3/4	62 50 1/4 +11 1/2 +15
1	65 1/4 55 1/4 +36 1/4 20 1/4
1 1/2	67 1/4 58 1/4 +39 1/4 25 1/4
2	71 1/4 62 1/4 +43 1/4 28 1/4

Lap Weld	
2	63 1/4 54 1/4
2 1/2	66 1/4 57 1/4
3	68 1/4 59 1/4
3 1/2	67 1/4 57 1/4
4	67 1/4 57 1/4
11 and 12	66 56

Butt Weld, extra strong, plain ends	
1/4	48 1/4 33 1/4
1/2	54 1/4 41 1/4
3/4	60 57 1/4
1	64 1/4 53 1/4
1 1/2	66 1/4 58 1/4
2	71 1/4 62 1/4

Lap Weld, extra strong, plain ends	
2	61 1/4 53 1/4
2 1/2	64 1/4 56 1/4
3	69 61
3 1/2	68 58
4	67 57
11 and 12	66 56

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh	
Steel	
2 in. and 2 1/2	1 1/4 in. 1
1 in.	1 1/2 in. 8
2 1/2 in.—2 3/4 in.	2 in.—2 1/4 in. 13
3 in.	2 1/2 in.—2 3/4 in. 16
3 1/2 in.—4 in.	3 in. 17
4 in.	3 1/2 in. to 3 3/4 in. 18
4 1/2 in. to 6 in.	4 in. 20
	4 1/2 in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two points on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn	
1 in.	61
1 1/4 to 1 1/2 in.	53
1 1/2 in.	37
2 to 2 1/2 in.	27
2 1/2 to 3 in.	34
Hot-Rolled	
2 and 2 1/2 in.	33
2 1/2 and 3 in.	40
3 in.	47
3 1/4 to 3 3/4 in.	50
3 3/4 to 4 in.	52
4 to 4 1/2 in.	52
4 1/2 to 5 in.	52
5 to 6 in.	42

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb. base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard

gages take the mechanical tube list and discounts. Intermediate sizes and extra not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List	
Carbon, 0.10% to 0.30% base (carloads)	5
Carbon, 0.30% to 0.40% base	10
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

RAILS AND TRACK SUPPLIES

F.o.b. Mill	
Standard rails, 60-lb. and heavier, per gross ton	\$40.00
Angle bars, per 100 lb.	2.5

F.o.b. Code Basing Points

Angle bars, per 100 lb.	2.30
F.o.b. Code Basing Points	
Light rails (from billets) per gross ton	\$32.00
Light rails (from rail steel) per gross ton	31.00
Base per 100 Lb.	
Spikes, 9/16 in. and larger	\$2.40
Spikes, 1/2 in. and smaller	2.60
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Track bolts, to steam railroads	3.40
Track bolts, to jobbers, all sizes (per 100 count)	.73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	

Per Cent Off List	
Machine bolts	10
Carriage bolts	10
Lag bolts	10
Pilow bolts, Nos. 1, 2, 3 and 7 heads	10
Hot-pressed nuts, blank or tapped, square	10
Hot-pressed nuts, blank or tapped, hexagonal	10
C.p.e. and t. square or hex nuts, blank or tapped	10
Semi-finished hexagon nuts	10
Semi-finished hexagon castellated nuts	10
S.A.E.	10
Stove bolts in packages, P'h.	7 1/2%, 25 and 10
Stove bolts in packages, Chgo.	7 1/2%, 25 and 10
Stove bolts in packages, Cleveland	7 1/2%, 25 and 10
Stove bolts in bulk, P'h.	7 1/2%, 25 and 10
Stove bolts in bulk, Chicago	7 1/2%, 25 and 10
Stove bolts in bulk, Cleveland	7 1/2%, 25 and 10
Tire bolts	7 1/2%, 25 and 10

Large Rivets

(1/4-in. and larger)

Base per 100 Lb.	
F.o.b. Pittsburgh or Cleveland	\$2.50
F.o.b. Chicago	2.60

Small Rivets

(7/16-in. and smaller)	
Per Cent Off List	
F.o.b. Pittsburgh	70, 10 and 1
F.o.b. Cleveland	70, 10 and 1
F.o.b. Chgo or Birm'g'm.	70, 10 and 1

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List	
Milled cap screw, 1 in. dia. and smaller	25
Milled standard set screws, case hardened, 1 in. dia. and smaller	50
Milled headless set screws, cut thread, 1/4 in. and smaller	75 and 10
Unset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Unset set screws, sq. head	85
Milled studs	75

SEMI-FINISHED STEEL

Billets, Blooms and Slabs	
F.o.b. Pittsburgh, Youngstown, Chicago, Gary, Buffalo, Cleveland, Birmingham	

Per Gross Ton

Rerolling	\$26.00
Forging quality	31.00

Sheet Bars

F.o.b. Pittsburgh, Youngstown, Cleveland, Chicago, Buffalo, Canton, Sparrows Point	
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Per Gross Ton

Open-hearth or Bessemer	\$26.00
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Skelp

F.o.b. Pittsburgh, Youngstown, Chicago, Buffalo, Coatesville, Pa., or Sparrows Point, Md.	
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Per Lb.

Grooved	1.00c.
Universal	1.00c.
Sheared	1.00c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$35.00
Cleveland	35.00
Chicago	36.00
Birmingham	38.00
Youngstown (del'd)	36.00

ALLOY STEEL BLOOMS, BILLETS AND SLABS

F.o.b. Pittsburgh, Chicago, Buffalo, Meadville, Canton or Bethlehem.
Base price, \$19 a gross ton except at Bethlehem, where it is \$51.

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville	
Prompt	\$3.75
Foundry, f.o.b. Connellsville	
Prompt	\$4.25 to 5.00
Foundry, by-product, Chicago ovens, for delivery outside switching districts	8.00
Foundry, by-product, delivered in Chicago switching district	8.75
Foundry, by-product, New England, delivered	10.50
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	8.76
Foundry, Birmingham	4.75
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal (Nominal)

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.50 to \$2.00
Mine run coking coal f.o.b. W. Pa.	1.75 to 2.25
Gas coal, 1/4-in., f.o.b. Pa. mines	2.00 to 2.50
Mine run gas coal, f.o.b. Pa. mines	2.00 to 2.25
Steam slack, f.o.b. W. Pa. mines	85c. to 1.00
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.25

Fuel Oil

	Per Gal. f.o.b. Bayonne, N. J.
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
	Per Gal. f.o.b. Baltimore
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
	Per Gal. del'd Chicago
No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.23c.
	Per Gal. f.o.b. Cleveland
No. 3 distillate	5.50c.
No. 4 industrial	5.25c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works
	High-heat Intermediate Duty Brick
Pennsylvania	\$45.00
Maryland	40.00
New Jersey	55.00
Ohio	45.00
Kentucky	45.00
Missouri	45.00
Illinois	45.00
Ground fire clay, per ton	7.00

Chrome Brick

	Per Net Ton
Standard size	\$15.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	\$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	\$65.00
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	\$13.00 to \$14.00
4-in., del'd Chicago	46.00 to 47.00
6-in., and larger, del'd New York	38.00
4-in., del'd New York	42.00
6-in., and larger, Birmingham	\$35.00 to 36.00
4-in., Birmingham	38.00 to 39.00
Class "A" and gas pipe, \$3 extra.	

Pig Iron, Ores, Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	\$18.00	\$18.50	\$17.50	\$19.00
Bethlehem, Pa.	17.50	18.00	17.00	18.50
Birdsboro, Pa.	17.50	18.00	17.00	18.50
Swedeland, Pa.	17.50	18.00	17.00	18.50
Sperrows Point, Md.	17.50	18.00	17.00	18.50
Neville Island, Pa.	18.00	18.00	17.50	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown	17.50	17.50	17.00	18.00
Buffalo	17.50	18.00	16.50	18.50
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, Ohio	17.50	17.50	17.00	18.00
Hamilton, Ohio	17.50	17.50	17.00	18.00
Duluth, Minn.	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	
Birmingham	18.00	18.00		18.50
Provo, Utah	13.50		12.50	
	16.50			

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston and nearby New England				
From Everett, Mass.	\$18.50	\$19.00	\$18.00	\$19.50
From Buffalo	18.50	19.00	18.00	19.50
Brooklyn				
From East, Pa. or Buffalo	19.77	20.27	19.27	20.77
Newark or Jersey City, N. J.	18.89	19.39	18.39	19.89
From East, Pa. or Buffalo				
Philadelphia	18.26	18.76	17.76	19.26
From Eastern Pa.				
Cincinnati	18.51	18.51	18.01	19.01
From Hamilton, Ohio				
Canton, Ohio	18.76	18.76		
From Cleveland and Youngstown				
Columbus, Ohio	19.50	19.50		
From Hamilton, Ohio				
Mansfield, Ohio	19.26	19.26		
From Cleveland and Toledo				
Indianapolis	19.77	19.77		
From Hamilton, Ohio				
South Bend, Ind.	19.55	19.55		
From Chicago				
Milwaukee	18.50	18.50		
From Chicago				
St. Paul	19.44			
From Duluth				
Davenport, Iowa	19.26	19.26		
From Chicago				
Kansas City	20.04	20.54		
From Granite City				

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points:	
Birdsboro, Pa., Steel-	
ton, Pa. and Sandish, N. Y.	\$22.00
Johnson City, Tenn.	22.00
F.o.b. Valley furnace	22.00
Del'd Chicago	27.65

GRAY FORGE PIG IRON

Valley furnace	\$17.50
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CHARCOAL PIG IRON

Lake Superior furnace	\$20.50
Delivered Chicago	23.54
Delivered Buffalo	23.78

CANADA

Pig Iron

Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carload)	\$82.00
Domestic, 80%, seaboard, (less carloads)	89.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	\$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Silvery Iron

	F.o.b. Jackson, Ohio, Furnace
	Per Gross Ton
6%	\$22.25
7%	23.25
8%	24.25
9%	25.25
10%	26.25
11%	27.25
	Per Gross Ton
12%	\$29.25
13%	30.75
14%	32.25
15%	33.75
16%	35.25
17%	36.75

Ferrovanadium, del., per lb. contained Va.	\$2.60 to \$2.80
Ferrocobalt, 15 to 18% per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with \$2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with \$2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del. 95c.	
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	\$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	\$5 a ton higher

Ores

	Per Gross Ton
Old range, Bessemer, 51.5% iron	\$4.80
Old range, non-Bessemer, 51.5% iron	4.65
Mesabi Bessemer, 51.5% iron	4.65
Mesabi non-Bessemer, 51.5% iron	4.50
High phosphorus, 51.5% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c.
Iron, low phos., Swedish, average 68 1/2% iron	8.50c.
Iron, basic or foundry, Swedish, average, 65% iron	8c.
Iron, basic or foundry, Russian, aver. 65% iron (nom.)	8c.
Manganese, Caucasian, washed 52%	22c.
Manganese, African, Indian, 44-48%	20c.
Manganese, African, Indian, 40-51%	21c.
Manganese, Brazilian, 46 to 48%	17c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid	\$12.00
Tungsten, domestic scheelite*	\$11.00 to \$12.00
	Per Gross Ton
Chrome, 45%, Cr2O3, crude, c.i.f. Atlantic seaboard	16.00
Chrome, 45%, Cr2O3, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	\$15.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	18.50
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$12.50 to \$13.00
No. 2 heavy melting steel	11.00 to 11.50
No. 2 railroad wrought	12.50 to 13.00
Scrap rails	12.50 to 13.00
Rails 3 ft. and under	15.00 to 15.50
Sheet car crops, ordinary	15.00 to 15.50
Compressed sheet steel	12.50 to 13.00
Hand bundled sheet steel	11.50 to 12.00
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	9.75 to 10.25
Short shov. steel turnings	9.75 to 10.25
Short mixed borings and turnings	8.50 to 9.00
Cast iron borings	8.50 to 9.00
Cast iron carwheels	12.00 to 12.50
Heavy breakable cast	10.50 to 11.00
No. 1 cast	11.50 to 12.00
Railr. knuckles and couplers	14.00 to 14.50
Rail. coil and leaf springs	14.00 to 14.50
Roller steel wheels	14.00 to 14.50
Low phos. billet crops	15.50 to 16.00
Low phos. sheet bar crops	15.00 to 15.50
Low phos. plate scrap	14.50 to 15.00
Low phos. punchings	15.00 to 15.50
Steel car axles	15.00 to 15.50

CHICAGO

Delivered Chicago district consumers:	
	Per Gross Ton
Heavy melting steel	\$9.50 to \$9.75
Shoveling steel	9.50 to 9.75

	Per Net Ton
Hydraulic comp. sheets	\$7.75 to \$8.25
Drop forge flashings	7.25 to 7.75
No. 1 bushing	7.75 to 8.25
Roller carwheels	11.00 to 11.50
Railroad tires	10.75 to 11.25
Railroad leaf springs	11.00 to 11.50
Axle turnings	8.00 to 8.50
Steel couplers and knuckles	10.50 to 11.00
Coil springs	11.50 to 12.00
Axle turnings (elec. fur.)	8.00 to 8.50
Low phos. punchings	11.50 to 12.00
Low phos. plates, 12 in. and under	11.50 to 12.00
Cast iron borings	6.00 to 6.50
Short shoveling turnings	6.00 to 6.50
Machine shop turnings	5.50 to 6.00
Rolling rails	11.00 to 11.50
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	12.00 to 12.50
Angle bars, steel	10.50 to 11.00
Cast iron carwheels	10.00 to 10.50
Railroad malleable	9.50 to 10.00
Agricultural malleable	8.00 to 8.50

	Per Net Ton
Iron car axles	\$12.50 to \$13.00
Steel car axles	11.00 to 11.50
No. 1 railroad wrought	8.25 to 8.75
No. 2 railroad wrought	8.25 to 8.75

No. 2 busheling	\$4.00 to \$4.50
Locomotive tires, smooth	9.00 to 9.50
Pipe and flues	4.75 to 5.25
No. 1 machinery cast	10.00 to 10.50
Clean automobile cast	10.00 to 10.50
No. 1 railroad cast	8.50 to 9.00
No. 1 agricultural cast	8.75 to 9.25
Stove plate	7.00 to 7.50
Grate bars	6.75 to 7.25
Brake shoes	8.75 to 9.25

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	8.50 to 9.00
No. 1 railroad wrought	11.00
Bundled sheets	\$8.00 to 8.50
Hydraulic compressed, old	9.00 to 9.50
Machine shop turnings	7.50
Heavy axle turnings	9.50
Cast borings	7.00
Heavy breakable cast	10.50 to 11.00
Stove plate (steel works)	8.50 to 9.00
No. 1 low phosph. heavy	13.00 to 14.00
Couplers and knuckles	33.00 to 35.00
Rolled steel wheels	13.00 to 13.50
No. 1 blast furnace	6.00 to 6.50
Spec. iron and steel pipe	9.00 to 9.50
Shafting	14.50 to 15.00
Steel axles	13.50 to 14.00
No. 1 forge fire	10.50
Cast iron car wheels	11.00 to 12.00
No. 1 cast	11.00 to 12.00
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00 to 12.50

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$10.25 to \$10.75
No. 2 heavy melting steel	9.75 to 10.25
Compressed steel	9.00 to 9.50
Light bundled sheet stampings	6.50 to 7.00
Drop forge flashings	9.00 to 9.50
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	7.50 to 8.00
No. 1 busheling	9.00 to 9.50
Steel axle turnings	7.50 to 8.00
Low phosph. billet crops	12.50 to 13.00
Cast iron borings	7.00 to 7.50
Mixed borings and short turnings	7.00 to 7.50
No. 2 busheling	7.00 to 7.50
No. 1 cast	11.00 to 11.50
Railroad grate bars	6.50 to 7.00
Stove plate	7.50 to 8.00
Rails under 3 ft.	10.00 to 10.50
Rails for rolling	10.50 to 11.00
Railroad malleable	10.00 to 10.50
Cast iron car wheels	11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$10.00
No. 2 heavy melting steel	9.00
Scrap rails	\$8.75 to 9.25
New hydraulic comp. sheets	9.00
Old hydraulic comp. sheets	8.50
Drop forge flashings	9.00
No. 1 busheling	10.50 to 11.00
Hvy. steel axle turnings	8.50 to 9.00
Machine shop turnings	6.00 to 6.50
Knuckles and couplers	11.50 to 12.00
Coil and leaf springs	11.50 to 12.00
Rolled steel wheels	11.50 to 12.00
Low phosph. billet crops	12.50 to 13.00
Short shov. steel turnings	7.00 to 7.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.00 to 6.50
Steel car axles	11.00 to 12.00
Iron axles	11.00 to 12.00
No. 1 machinery cast	11.00 to 11.50
No. 1 cupola cast	11.00 to 11.50
Stove plate	8.75 to 9.25
Steel rails, 3 ft. and under	12.50 to 13.00
Cast iron car wheels	10.00 to 10.50
Industrial malleable	10.50 to 11.00
Railroad malleable	10.50 to 11.00
Chemical borings	9.00 to 10.00

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$10.00 to \$10.50
Scrap steel rails	9.50
Short shoveling turnings	5.50
Stove plate	7.00 to 7.50
Steel axles	11.00 to 11.50
Iron axles	11.00 to 11.50
No. 1 railroad wrought	7.00 to 7.50
Rails for rolling	10.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	9.50 to 10.00
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$10.00 to \$10.50
No. 1 heavy melting	9.00 to 9.50
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires	8.50 to 9.00
Misc. stand.-sec. rails	10.00 to 10.50
Railroad springs	10.00 to 10.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.75 to 9.25
No. 1 busheling	6.50 to 7.00
Cast iron borings and shoveling turnings	4.75 to 5.25
Rails for rolling	10.50 to 11.00
Machine shop turnings	4.50 to 5.00
Heavy turnings	5.50 to 6.00
Steel car axles	11.50 to 12.00
Iron car axles	12.50 to 13.00
Wrot. iron bars and trans.	9.50 to 10.00
No. 1 railroad wrought	7.00 to 7.50
Steel rails less than 3 ft.	11.50 to 12.00
Steel angle bars	10.00 to 10.50
Cast iron car wheels	8.00 to 8.50
No. 1 machinery cast	9.00 to 9.50
Railroad malleable	9.50 to 10.00
No. 1 railroad cast	9.00 to 9.50
Stove plate	7.00 to 7.50
Relay rails, 60 lb. and under	16.00 to 16.50

Relay, rails, 60 lb. and over \$20.00 to \$21.00
Agricul. malleable 9.00 to 9.50

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$7.00 to \$7.50
Scrap T rails	6.75 to 7.25
Machine shop turnings	2.75 to 3.00
Cast iron borings	4.00 to 4.25
Bundled skeleton, long	5.50 to 6.00
Forge flashings	4.75 to 5.00
Blast furnace scrap	4.75 to 5.00
Shafting	9.00 to 9.50
Steel car axles	8.50 to 9.00
Wrought pipe	3.50 to 4.00
Rails for rerolling	6.00 to 6.50
Cast iron borings, chemical	7.50 to 8.00

Per gross ton delivered consumers' yards:	
Textile cast	\$10.00 to \$11.00
No. 1 machinery cast	10.00 to 11.00
Stove plate	6.25 to 6.50
Railroad malleable	11.00 to 12.00

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$8.00
No. 2 heavy melting steel	7.00
Unprepared yard iron and steel	\$3.50 to 4.00
No. 1 heavy breakable cast	6.50 to 6.75
Machine shop turnings	3.50
Short shoveling turnings	3.50
Cast borings	4.50 to 4.75
No. 1 blast furnace	3.50 to 4.00
Steel car axles	10.00 to 10.50

PITTSBURGH

Base per Lb.	
Plates	2.85c
Structural shapes	2.85c
Soft steel bars and small shapes	2.60c
Reinforcing steel bars	2.60c
Cold-finished and grooved stock	
Rounds and hexagons	3.20c
Squares and flats	3.20c
Hoops and bands, under 1/4 in.	2.95c
Hot-rolled annealed sheets (No. 24)	3.15c
25 or more bundles	3.15c
Galv. sheets (No. 24), 25 or more bundles	3.50c
Hot-rolled sheets (No. 10)	2.50c
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	\$3.32
Splines, large	2.40c
Small	2.65c
Boat	2.90c
Track bolts, all sizes, per 100 count	70 per cent off list
Machine bolts, 100 count	70 per cent off list
Carriage bolts, 100 count	70 per cent off list
Nuts, all styles, 100 count	70 per cent off list
Large rivets, base per 100 lb.	\$3.25
Wire, black, soft ann'l'd, base per 100 lb.	2.90
Wire, galv. soft, base per 100 lb.	3.35
Common wire nails, per keg	2.65c
Cement coated nails, per keg	2.45

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

Base per Lb.	
Plates and structural shapes	3.10c
Soft steel bars	2.90c
Cold-fn. steel bars and shafting	
Rounds and hexagons	3.25c
Flats and squares	3.25c
R-14, 3/16 in. (in Nos. 10 and 12 gages)	3.20c
Hoops (No. 14 gage and lighter)	3.20c
Hot-rolled annealed sheets (No. 24)	3.70c
Galv. sheets (No. 24)	4.30c
Hot-rolled sheets (No. 10)	2.85c
Stokes (9/16 in. and lighter)	3.50c
Track bolts	4.50c
Nuts, structural (keg lots)	3c
Rivets, boiler (keg lots)	3.10c
Machine bolts	Per Cent Off List
Carriage bolts	65
Coupler and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotter pins	60 and 10
Store bolts	72 1/2
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	\$5.50 off list
No. 8 black ann'l'd wire per 100 lb.	\$3.45
Com. wire nails, base per keg	2.70c
Cement c'd nails, base per keg	2.70c

NEW YORK

Base per lb.	
Plates and struc. shapes	3.10c
Soft steel bars, small shapes	3.10c
Iron bars, swed. charcoal	6.00c to 6.50c
Cold-fn. shafting and screw stock	65
Rounds and hexagons	3.70c
Flats and squares	4.20c
Cold-roll. strip, soft and quarter hard	4.00c
Hoops	3.90c
Hot-rolled sheets (No. 24)	3.90c
Hot-rolled ann'l'd sheets (No. 24)	3.85c
Galvanized sheets (No. 21)	4.25c
Long term sheets (No. 24)	4.75c
Standard tool steel	12.00c
Wire, black annealed (No. 10)	3.60c
Wire, galv. annealed (No. 10)	4.00c
Tire steel 1/4 x 1/4 in. and larger	3.40c
Smooth finish, 1 to 2 1/2 x 1/4 in. and larger	3.75c

Spec. iron and steel pipe	\$4.50 to \$5.00
Forge fire	5.50 to 6.00
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Rails for rolling	5.50 to 6.00
No. 1 cast	7.00 to 7.50
No. 2 cast	6.00 to 6.50
Stove plate	6.00 to 6.50
Cast borings (chemical)	12.00 to 12.50

Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$10.00
No. 1 hvy. cast (cupola size)	9.00
No. 2 cast	8.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$9.00 to \$9.50
Scrap rails for melting	9.25 to 9.75
Loose sheet clippings	5.00 to 5.50
Bundled sheets	6.00 to 6.50
Machine shop turnings	5.50 to 6.00
No. 1 busheling	7.00 to 7.50
No. 2 busheling	3.50 to 4.00
Rails for rolling	9.50 to 10.00
No. 1 locomotive tires	8.50 to 9.00
Short rails	11.25 to 11.75
No. 1 machinery cast	8.50 to 9.00
No. 1 railroad cast	9.50 to 10.00
Burnt cast	7.00 to 7.50
Stove plate	7.00 to 7.50
Agricultural malleable	8.75 to 9.25
Railroad malleable	9.25 to 9.75

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$7.75 to \$8.25
Borings and short turnings	6.00 to 6.50
Long turnings	5.50 to 6.00
No. 1 machinery cast	7.75 to 8.25
Automotive cast	9.50 to 10.00
Hydraul. comp. sheets	7.75 to 8.25
Stove plate	5.75 to 6.25
New factory busheling	7.00 to 7.50
Old No. 2 busheling	5.00 to 5.50
Sheet clippings	3.25 to 3.75
Fishings	6.25 to 6.75
Low phosph. plate scrap	8.50 to 9.00

CANADA

Dealers' buying prices per gross ton:	
	Toronto Montreal
Heavy melting steel	\$5.50 \$5.50
Raila. scrap	6.00 6.50
Machine shop turnings	2.50 2.50
Boiler plate	4.50 4.50
Heavy axle turnings	2.50 2.50
Cast borings	3.00 3.00
Steel borings	2.00 2.00
Wrought pipe	2.50 2.50
Steel axles	4.50 6.00
Axles, wrought iron	4.50 6.50
No. 1 machinery cast	7.75 9.00
Stove plate	4.50 5.50
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

Warehouse Prices for Steel Products

Open hearth spring steel, bases	3.75c to 10.00c
Common wire nails, base, per keg	\$2.90
Machine bolt, cut thread:	Per Cent Off List
3/4 x 6 in. and smaller	65
1 x 30 in. and smaller	65
Carriage bolts, cut thread:	65
3/4 x 6 in. and smaller	65
3/4 x 20 in. and smaller	65
Boiler tubes:	Per 100 Ft.
Lan welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.	
Plates and struc. shapes	3.25c
Rars, soft steel or iron	3.00c
Cold-fn. rounds, shafting, screw stock	3.61c
Hot-rolled annealed sheets (No. 24)	3.60c
Galv. sheets (No. 24)	4.25c
Hot-rolled sheets (No. 10)	3.10c
Black corrug. sheets (No. 24)	3.85c
Galv. corrug. sheets	4.30c
Structural rivets	3.25c
Boiler rivets	3.25c
Tank rivets, 7/16 in. and smaller	65
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, pivot bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	
1000 lb. or over	65
200 to 999 lb.	60
100 to 199 lb.	55
Less than 100 lb.	50

PHILADELPHIA

Base per Lb.	
*Plates, 1/4-in. and heavier	2.60c
*Structural shapes	2.60c
*Soft steel bars, small shapes, iron bars (except bands)	2.60c
Reinforc. steel bars, sq., twisted and deform.	2.80c
Cold-finished steel bars	3.60c
*Steel hoops	3.15c
*Steel bands, No. 12 to 3/16 in. incl.	2.90c
Spring steel	5.00c
*Hot-rolled annealed sheets (No. 24)	3.75c
*Galvanized sheets (No. 24)	3.75c
*Hot-rolled annealed sheets (No. 10)	2.75c
Diam. pat. floor plates, 1/4 in.	4.35c
Swedish iron bars	6.00c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deductions on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

CLEVELAND

Base per Lb.	
Plates and struc. shapes	2.95c
Soft steel bars	2.75c
Reinforc. steel bars	1.75c to 2.35c
Cold-fn. steel bars	
Rounds, squares, hexagons	3.25c
Flats	3.40c
Flat rolled steel under 1/4 in.	3.00c
Cold-finished strip	5.55c
Hot-rolled annealed sheets (No. 24)	3.25c
Galvanized sheets (No. 24)	3.85c
Hot-rolled sheets (No. 10)	2.75c
Black ann'l'd wire, per 100 lb.	\$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

Base per Lb.	
Plates and struc. shapes	3.25c
Rars, soft steel or iron	3.00c
New billet reforc. bars	3.00c
Rail steel reforc. bars	3.00c
Hoops	3.75c
Bands	3.20c
Cold-finished bars	3.57c

PACIFIC COAST

Base per Lb.	
	San Francisco Los Angeles Seattle
Plates, tank and U.M.	4.00c 4.00c 4.0

Producers Hold Electrolytic Offerings at 9c.; Custom Smelters Drop to 8.75c.

Moderate Sales of Prime Western Recorded at 4.75c. a lb.
Lead Sales Ease Off—Tin Consumers Continue Uninterested

NEW YORK, Oct. 10.—In an attempt to establish a trading level to gage their scrap purchases, custom smelters made offerings of electrolytic copper Saturday at 8.75c. a lb., delivered Connecticut Valley. Major producers, however, are maintaining quotations at 9c., but their position has not been tested under pressure of attractive inquiries. Despite the lack of general consumer response to the shading, market observers contend that sufficient metal has been moved at 8.75c. to make the market quotable at that figure. Fabricators are drawing freely on their unshipped reserves, and the volume of current shipments is leading to the expectation of an additional moderate stock decrease as a result of September activity. Deputy administrators are still attempting to reconcile mine producers and custom smelters to a definite intermediate position relative to the disputed code provision of a

weighted average selling price, but apparently no progress is being made. It is expected that the Administration will soon force all parties to sign a code of their own making or one presented by the NRA.

Trading abroad is spotty and in low volume. Quotations ranged from 8c. to 8.50c. throughout the week, but reacted to weakness here and rapidly dropped below 8c. yesterday. Katanga representatives offered African metal early today at 7.87½c. a lb. c. i. f. usual Continental ports, but buying response is reported as negligible.

Tin

Despite the firm London position and statistics conducive to buying, American consumers are showing no inclination to book additional supplies. Current activity is limited to scattered tonnages at prices ranging from 48.37½c. to 49.12½c. a lb., New York. The indisposition of buyers to

consider forward needs more generally is believed to arise from the uncertainty of future dollar movements and the danger of labor strife affecting production schedules. London quotations advanced during the week under pressure from speculative buying and enhanced consumer interest influenced by recently released statistics. Postings on first call this morning in London were £231 17s. 6d. for spot Straits and £224 17s. 6d. for spot and future standard metal. No official statement has yet been made concerning the status of Pool stocks, but the International Tin Committee is expected soon to announce a decision regarding quota revisions. According to a recent dispatch from the International Council, United States purchases of tin for the year ended July, 1933, totaled 11,400 tons in excess of the corresponding period of 1932. The tin plate industry bought over 4000 tons more tin than in the same period in 1932.

Zinc

Dropping from the high position of the previous period, sales last week aggregated 4000 tons at 4.75c. a lb., East St. Louis, which is approximately the normal routine consumptive demand of the current market. Producers are willing to take January positions, and are desirous of booking future metal, but are not inclined to force spelter on an uninterested market. The Prime Western price position is considered very firm. Announcement by the American Zinc Institute of an improved statistical position, as a result of September activity, had no apparent effect on market trading. September shipments of slab zinc totaled 35,347 tons, which reduced visible stocks to 98,219 tons. The shipments were in excess of those for any one month in 1932 or early 1933, and current stocks are at the lowest level reported since early in 1930. Joplin concentrates are firm at \$31 a ton, and production is currently in excess of sales. The high position of the stock surplus prohibits an immediate upward revision in prices for spelter.

Lead

More favorable monetary stabilization reports, together with copper weakness, are influencing buying sentiment, and current lead bookings are limited to sporadic tonnages which are estimated at less than average daily ore intakes. Prices are unchanged at 4.35c. a lb., St. Louis, and 4.50c., New York, and any shading of quotations in the near future is not expected in view of the firm position maintained by major smelters. Observers estimate that consumers' October requirements are currently less than 80 per cent covered, and over 60 per cent of estimated November supplies remains to be sold. The spread of strikes among fabricators is causing many buyers to refrain from taking their usual future positions.

The Week's Prices. Cents Per Pound for Early Delivery

	Oct. 4	Oct. 5	Oct. 6	Oct. 7	Oct. 9	Oct. 10
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.50	8.50	8.50
Lake copper, New York	9.00	9.00	9.00	8.75	8.75	8.75
Straits tin, Spot, N. Y.	48.75	49.12 ½	48.85	—	48.37 ½	48.37 ½
Zinc, East St. Louis	4.75	4.75	4.75	4.75	4.75	4.75
Zinc, New York	5.12	5.12	5.12	5.12	5.12	5.12
Lead, St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Lead, New York	4.50	4.50	4.50	4.50	4.50	4.50

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.87½c. a lb., New York.
Brass ingots, 85-5-5-5, 9c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	50.00c. to 51.00c.
Tin, bar	52.00c. to 53.00c.
Copper, Lake	10.50c. to 11.25c.
Copper, electrolytic	10.25c. to 10.75c.
Copper, castings	10.00c. to 11.00c.
*Copper sheets, hot-rolled	17.12½c.
*High brass sheets	14.75c.
*Seamless brass tubes	16.37½c.
*Seamless copper tubes	16.62½c.
*Brass rods	12.25c.
Zinc, slabs	6.00c. to 7.00c.
Zinc sheets (No. 9), casks	9.75c. to 10.00c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	7.00c. to 8.00c.
Lead, sheets	8.25c.
Antimony, Asiatic	8.50c. to 9.50c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	30.00c. to 31.00c.
Babbitt metal, commercial grade	25.00c. to 50.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	51.25c.
Tin, bar	53.25c.

Copper, Lake	10.125c. to 10.25c.
Copper, electrolytic	10.125c. to 10.25c.
Copper, casting	9.875c. to 10.00c.
Zinc, slab	6.00c. to 6.25c.
Lead, American pig	5.35½c. to 5.50c.
Lead, bar	8.50c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	19.50c.
Babbitt metal, high grade	56.50c.
Solder, ½ and ½	29.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.00c.	8.00c.
Copper, hvy. and wire	6.75c.	7.75c.
Copper, light and bottoms	5.75c.	6.25c.
Brass, heavy	3.75c.	4.50c.
Brass, light	3.50c.	3.75c.
Hvy. machine composition	5.25c.	6.00c.
No. 1 yel. brass turnings	5.00c.	5.625c.
No. 1 red brass or compos. turnings	5.00c.	5.50c.
Lead, heavy	3.50c.	3.875c.
Zinc	2.75c.	3.25c.
Cast aluminum	7.50c.	8.75c.
Sheet aluminum	11.50c.	13.00c.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NEW ENGLAND ▶

Monsanto Chemical Works, 1724 South Second Street, St. Louis, has let general contract to William M. Bailey Co., 88 Broad Street, Boston, for new multi-unit plant for production of ethyl alcohol adjoining works of Merrimac Chemical Co., Everett, Mass., a subsidiary. Cost over \$500,000 with machinery. New plant will be operated by New England Alcohol Co., now being formed as affiliated interest of Monsanto company.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 17 for 1420 alloy steel forgings (Schedule 797) for Newport, R. I., Navy Yard.

C. M. Merrick & Co., Inc., Brockton, Mass., has been organized by Clayton M. Merrick, 41 Byron Street, and associates, to manufacture oil burners and oil-burning equipment.

School Board, Milford, Mass., A. A. Caswell, superintendent of schools, plans manual training department in new high school. Cost about \$250,000. Robert A. Cook, 57 Prospect Street, is architect.

Town Council, Hampton, N. H., plans installation of pumping machinery and other equipment, sewage treatment works, pipe lines, etc., for extensions and improvements in sewerage system. Financing arranged for \$160,000.

E. Ingraham Co., North Main Street, Bristol, Conn., manufacturer of clocks, clock mechanisms, etc., will build one-story addition, about 18,000 sq. ft. floor space. Cost over \$30,000 with equipment.

◀ BUFFALO DISTRICT ▶

Genesee Brewing Co., 100 National Street, Rochester, N. Y., plans expansion and improvements, including new equipment. Company has arranged for sale of stock totaling about \$575,000, part of fund to be used for work.

Chapman Bearing & Engineering Corp., Buffalo, has been organized by Albert E. Douglass, 308 Tremaine Avenue, and associates, capital \$200,000, to manufacture automotive bearings and other equipment.

H. H. Tromanhauser, 9 Adelaide Street West, Toronto, Ont., consulting engineer, representing a group of grain interests now forming a joint company, has let general contract to Kilmer, Gibson & Van Nostrand, Toronto, for grain elevator at Fort Erie, Ont., including two-story storage and distributing plant, 300 x 400 ft. Equipment will include elevating, conveying, loading and other machinery to handle about 70,000 bu. an hr. Cost \$1,750,000 with equipment.

Village Council, Angola, N. Y., plans installation of pumping machinery and accessories, filtration equipment, pipe lines, etc., for extensions and improvements in municipal waterworks. Cost about \$50,000 with machinery. Project has been approved at special election.

◀ NORTH ATLANTIC ▶

Swift & Co., Inc., 32 Tenth Avenue, New York, meat packer, has filed plans for new four-story market at West Thirteenth and Washington Streets, 103 x 150 ft. Cost about \$200,000 with equipment.

Strope Steel Co., Inc., Albany, N. Y., has been organized by Walter E. Strope, Delmar, N. Y., and Saul D. Harvith, 418 Hudson Avenue, Albany, to manufacture iron and steel specialties.

Commanding Officer, Mitchel Field, N. Y., has secured appropriation of \$400,858 for new buildings and equipment, including field shops, railroad spur shops, hangars, field warehouses, quartermaster storage and distributing building, new water pumping plant, coal storage and handling system, sewage disposal plant, gasoline storage, radio building and other units. Also \$70,000 for reconditioning and improvements, including underground electric line and other utilities.

Bureau of Supplies and Accounts, Navy Department, Washington, has secured appropriations of \$185,000 and \$140,000 for tools and machinery for navy yards at New York and Philadelphia, respectively. Early call for bids is planned.

Nero Mfg. Corp., New York, has been organized by Harry Charmoy, 105-17 133rd Street, Richmond Hill, N. Y., and associates, to manufacture metal products.

New York Sun, 280 Broadway, New York, will make extensions and improvements in printing plant, including battery of new super-production presses, electrical drives, conveyors and other equipment. Cost over \$500,000. Contract for 24 presses has been let to R. Hoe & Co., 138th Street and East River, which will increase production schedule, recalling over 300 men.

Borg-Warner Service Parts Co., 29 West Sixtieth Street, New York, automobile parts, has leased space in Port Authority Commerce Building, 111 Eighth Avenue, 10,000 sq. ft., for new storage and distributing plant.

Francis H. Leggett & Co., Twenty-seventh Street and Thirteenth Avenue, New York, wholesale grocers and food packers, have leased industrial plant unit at Glassboro, N. J., 40,000 sq. ft. floor space, for new branch packing plant, storage and distributing building.

Construction Quartermaster, Fort Monmouth, N. J., has secured appropriation of \$796,667 for new buildings and equipment for local signal school, including forge and blacksmith shop, utility shops, quartermaster storage and distributing building, quartermaster automobile service and garage building, incinerator, signal corps laboratory and other units. Also \$75,000 for reconditioning and improving electrical system and other utilities.

Dura Electric Lamp Co., 536 South Tenth Street, Newark, N. J., manufacturer of electric lamp; for automobile headlights, etc., has leased part of three-story factory at Sherman Avenue, East Bigelow and Clifton Streets, for new plant.

Hoffman Beverage Co., Inc., 420 Grove Street, Newark, N. J., has let general contract to Turner Construction Co., 420 Lexington Avenue, New York, for new seven-story and basement brewing plant on adjoining site. Cost about \$900,000 with equipment.

Edison Electrical Controls, Inc., 51 Lakeside Avenue, West Orange, N. J., has been organized as a subsidiary of Thomas A. Edison, Inc., same address, capital \$100,000, to manufacture electrical control equipment and accessories.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 17 for 50 indicating aircraft accelerometers (Schedule 784); until Oct. 24 for 300 aircraft fuel gages (Schedule 799) for Philadelphia Navy Yard.

Lee Tire & Rubber Co., Conshohocken, Pa., has awarded general contract to Stofflet & Tiltonson, Wesley Building, Philadelphia, for one-story addition, 60 x 100 ft. Cost about \$30,000 with equipment.

John F. Betz & Son, Inc., Willow and Lawrence Streets, Philadelphia, has asked bids on general contract for extensions and improvements in brewing plant. Cost about \$100,000 with equipment. Clarence E. Wunder, Architects' Building, is architect.

Penn Brewing Co., Steelton, Pa., recently organized by Ralph Meckley, Middletown, Pa., and associates, has acquired former local National Brewery, and will modernize for plant. Cost over \$80,000 with machinery.

Constructing Quartermaster, Army Air Depot, Middletown, Pa., has secured fund of \$1,542,226 for new buildings and equipment. Work will include new assembling shops, about 250 x 800 ft.; hangars and test block; equipment storage and distribution buildings; paint, oil and dope storage and distribution plant; steam power house for central heating; oil reclamation building and other structures. Appropriation of \$98,750 has been approved for reconditioning and improvements, including electrical system, railroad system, water and sewerage systems and other utilities.

◀ WESTERN PENNA. ▶

Valley Mead Brewing Co., Meadville, Pa., P. J. Carll, head, has plans for new multi-story brew-house, bottling works and auxiliary units. Cost about \$100,000 with equipment. F. F. Bollinger, Ambridge, Pa., is architect.

United States Engineer Office, Huntington, W. Va., asks bids until Oct. 17 for two parallel locks at Gallipolis lock and dam, Ohio River, near Hogsett, W. Va., including 115,300 lb. steel forgings, 152,800 lb. nickel steel, 900,000 lb. reinforcing steel, 402,000 lb. steel and cast iron pipe castings, 20,000 lb. bolts, etc., eight lock gate operating machines, six tainter gate valves and auxiliary equipment (Circular 30).

Joseph S. Finch & Co., Inc., Clark Building, Pittsburgh, distiller, has let general contract to Rust Engineering Co., Koppers Building, for three new buildings at plant at Schenley, Pa., consisting of two-story and basement bottling plant, 60 x 140 ft., one-story storage and distributing building, 120 x 210 ft., and main nine-story unit, 128 x 147 ft. Cost over \$175,000 with equipment. Plans are under way for new two-story fermenting and still house, 66 x 95 ft. Cost over \$50,000 with machinery. Carl J. Kiefer, Schmidt Building, Cincinnati, is engineer.

Common Council, Beckley, W. Va., plans municipal electric light and power plant. Cost over \$60,000.

◀ SOUTH ATLANTIC ▶

Commanding Officer, Fort Benning, Ga., has received appropriation of \$6,002,483 for new buildings and equipment, including ordnance shops, tank shops and sheds, quartermaster warehouses, print shop, hangar with repair and reconditioning shop, gun sheds, steam power house for central heating, gas storage system. Also \$350,000 for improvements and reconditioning, including electrical system, railroads and other utilities.

American Enka Corp., Enka, near Asheville, N. C., manufacturer of cellulose rayon products, plans additions to mills, totaling over 70,000 sq. ft. floor space, with installation of new equipment. Also improvements in present plant and machinery repairs and replacements, recently noted in these columns. Power house addition also will be built. Entire project will cost over \$850,000 with equipment.

National Wood Fibre Growers' Association, Fernandina, Fla., W. L. Wilson, Barnett Bank Building, Jacksonville, Fla., secretary, recently organized, plans new wood fiber products mill at Fernandina, including power house, machine shop and other mechanical structures, loading dock, etc. Financing in amount of \$5,500,000 is being arranged.

◀ WASHINGTON DISTRICT ▶

City Manager E. L. Udell, Radford, Va., asks bids until Oct. 24 for municipal hydro-electric power plant on Little River, including hydraulic turbine equipment with accessories, electric generators and auxiliaries, steel penstock, head gate, flood gates and flood gate hoist, switchboard, remote control equipment and complete auxiliaries. Fund of \$129,000 is available for project. Wiley & Wilson, Peoples National Bank Building, Lynchburg, Va., are consulting engineers.

Commanding Officer, Langley Field, Va., has secured appropriation of \$1,536,100 for new buildings and equipment, including hangar with repair and reconditioning shop, remodeling present hangars into shops, signal corps building, gasoline storage system, garages, central steam plant for heating. Also \$250,000 for improvements and reconditioning, including electric distribution system, coal storage, and other utilities.

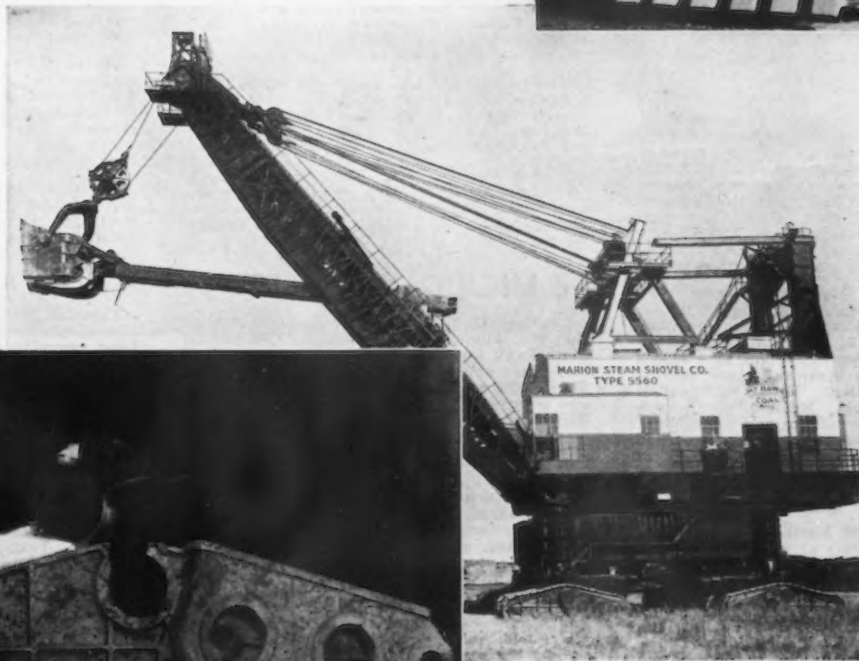
General Purchasing Officer, Panama Canal, Washington, asks bids until Oct. 19 for twist drills, stone drills, bolt dies, steel machine bolts, carriage bolts, brass bolts, ten transformers, steel rivets, 10,000 ft. copper-covered steel wire, 500 steel drums, 15,000 sheets galvanized corrugated roofing, track rails, rail clips, angle splice bars, etc. (Schedule 2909).

Board of Supervisors, Amherst County, Amherst, Va., plans installation of pumping ma-

The massive castings
of this Goliath among
Power Shovels were
ground by...

ALOXITE BRAND REDMANOL* SNAGGING WHEELS

REG. U.S. PAT. OFF. REG. U.S. PAT. OFF.



AMONG the vitally necessary tools in the building of this giant power shovel were Aloxite Brand Redmanol Grinding Wheels.

The 4,000 pound sheaves of manganese steel—the 18,000 pound side frames of carbon steel—were ground with these wheels with far greater speed—with cleaner cutting action—longer wheel life and consequently lower grinding costs.

AGAIN A CASE OF THE RIGHT WHEEL IN THE RIGHT PLACE

*Redmanol is a product of Bakelite Corp.

The Marion Steam Shovel Company, Marion, Ohio, built the shovel. It weighs 4,000,000 pounds—cost \$400,000 installed—has a capacity of 20 cubic yards.

You can drive a sedan through the dipper without touching the sides.

In 24 hours this shovel digs enough material to fill 7,500 trucks each carrying 4 cubic yards. In other words *some* shovel—and Aloxite Brand Wheels helped build it.

THE CARBORUNDUM COMPANY ~ NIAGARA FALLS, N. Y.
GRINDING WHEELS • ABRASIVE GRAIN • RUB BRICKS • ABRASIVE PRODUCTS
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(CARBORUNDUM AND ALOXITE ARE REGISTERED TRADE MARKS OF THE CARBORUNDUM COMPANY)

chinery and auxiliary equipment, pipe lines, etc., for extensions and improvements in water system at Madison Heights, Va., and vicinity. Elmer E. Barnard, Law Building, Lynchburg, Va., is consulting engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 17 for motor-driven boring, drilling and milling machines and equipment (Schedule 813) for Eastern and Western yards; 14 3-ton capacity, two 7-ton capacity and two fifth wheel semi-trailers (Schedule 821) for Philadelphia Navy Yard.

◀ OHIO AND INDIANA ▶

Cleveland Heater Co., 1900 West 112th Street, Cleveland, manufacturer of electric and gas heaters, parts, etc., has let general contract to Tepper & Limovitz, 3468 East 123rd Street, for one-story and basement addition, 100 x 120 ft. Cost about \$50,000 with equipment.

Hooster Brewing Co., 100 Eldon Avenue, Columbus, Ohio, H. C. Tuller, Jr., in charge, has engaged Albert Kahn, Inc., New Center Building, Detroit, architect and engineer, to prepare plans for new units. Cost over \$250,000 with equipment.

Firestone Tire & Rubber Co., Akron, Ohio, has acquired property at Cleveland for new multi-story factory branch, storage and distributing plant. Cost about \$150,000 with equipment.

Constructing Quartermaster, Patterson Field, Dayton, Ohio, has secured appropriation of \$2,610,111 for new buildings and equipment at Patterson and Wright air stations, including air depot shops, hangars, sewage disposal plant, quartermaster maintenance warehouse, oil reclamation building, paint and oil storage and distributing plants, gasoline storage system, static test building, technical data building, incinerator plant, and other structures.

Christian Moerlein Brewing Co., Inc., Provident Bank Building, Cincinnati, Joseph H. Asse, president and treasurer, has plans by Richard Griesser & Son, 54 West Randolph Street, Chicago, architects, for new plant at Paddock Road and Tennessee Avenue, where 30-acre tract has been secured. Work will include multi-story brew-house, bottling plant, mechanical-cooling unit, storage and distributing plant, with power house, machine shop and other departments. Cost about \$4,000,000, of which \$1,125,000 will be expended for buildings and \$1,178,000 for machinery. Company has recently arranged financing for \$5,000,000.

Gro-Flex Corp., 127 North East Street, Indianapolis, manufacturer of mechanical equipment, has let general contract to J. F. Ross, 5559 College Avenue, for one-story plant, 91 x 140 ft. Cost about \$27,000 with equipment.

Merchants Distilling Co., Terre Haute, Ind., care of W. C. Wagner, Breslin Building, Louisville, architect, has plans for extensions and improvements, including new units and equipment for distillery. Cost close to \$90,000 with machinery, including new power house.

Hammond Distilleries, Inc., Hammond, Ind., recently organized by Maxwell M. Nowak, head of Nowak Milling Co., Hammond, and associates, capital \$1,400,000, has taken over former local distillery and will modernize for new plant. Cost over \$100,000 with machinery.

◀ MIDDLE WEST ▶

Fritz Brewing Co., Freeport, Ill., has plans for extensions and modernization, to include brew-house, bottling and other equipment. Cost over \$85,000 with machinery. Meyer & Cook, 820 North Michigan Avenue, Chicago, are architects.

United States Engineer Office, First District, Chicago, asks bids until Oct. 16 for new pumping plant at Starved Rock, Marseilles and Dresden Island lock sites, including vertical centrifugal pumping units, electrical cables, controls, etc.; also for water distribution systems, including pipe lines, etc. (Circular 28).

Village Council, Hoffman, Minn., asks bids until Oct. 19 for pumping plant, 50,000-gal. tank on 100-ft. tower (steel or wood types), gate valves and accessory equipment for municipal water system. Starbuck Construction Co., Starbuck, Minn., is consulting engineer.

Range Brewing Co., 101-107 Howard Street, Hibbing, Minn., has plans for extensions and improvements in four-story plant, to include brew-house, bottling, refrigerating, loading and other equipment. Cost about \$150,000 with machinery. Ralph W. Richardson, New York Life Building, St. Paul, Minn., is architect.

City Council, Evanston, Ill., plans installation of elevated steel tank and tower, pumping machinery and auxiliary equipment, pipe lines, etc., for extensions and improvements in municipal waterworks. Financing in amount of \$250,000 has been arranged. Water Department will be in charge.

Board of Education, Colorado Springs, Colo., plans manual training department in new senior high school. Cost \$833,000. Financing is being arranged. Jay W. McCullough, Majestic Building, Denver, is engineer; Charles E. Thomas, Colorado Springs National Bank Building, Colorado Springs, is architect.

Village Council, Hanley Falls, Minn., asks bids until Oct. 20 for turbine pumping unit and accessory equipment for municipal waterworks. Starbuck Construction Co., Starbuck, Minn., is consulting engineer.

Cargill Elevator Co., Chamber of Commerce Building, Minneapolis, has let general contract to James Stewart Corp., 343 South Dearborn Street, Chicago, for rebuilding of grain processing plant, including power house, recently destroyed by fire. Cost about \$100,000 with conveying, elevating, cleaning, unloading, weighing and other equipment.

City of Oshkosh, Wis., has been granted loan of \$968,000 for new sewage plant and disposal system. Pearce, Greeley & Hanson, 6 North Michigan Avenue, Chicago, are consulting engineers. F. M. Wolverton is city engineer.

Racine Brewing Co., Racine, Wis., has been organized with \$100,000 capital stock by N. J. Bichler and N. C. Mueller, both of Belgium, Wis., to acquire former plant of Rowley Packing Co., Racine, and convert it into brewery.

Walter Brewing Co., Eau Claire, Wis., is reconditioning its brewing plant, idle 14 years, at cost of \$75,000 and will rehabilitate its malting plant and elevator at cost of \$50,000.

◀ MICHIGAN DISTRICT ▶

Continental Malt Co., Detroit, care of Martin E. Galvin, Commonwealth Commercial State Bank Building, recently organized, plans new plant at East Davison Avenue and Grand Trunk Railway, to include kiln unit, storage and distributing building and power house. Cost over \$100,000 with equipment.

Commanding Officer, Selfridge Field, Mich., has secured appropriation of \$707,014 for new buildings and equipment, including field shops and tools, quartermaster maintenance and repair building, completion of hangars, gasoline storage system, incinerator plant, garage, radio building, and other units.

Valley Welding & Boiler Co., 1317 South Water Street, Bay City, Mich., has been organized by John J. Hebert, 208 Stanton Street, and associates, to manufacture boilers, tanks and other plate products, and operate a general welding works.

Tivoli Brewing Co., 10129 Mack Street, Detroit, has plans for new brew-house. Cost over \$65,000 with equipment. Mildner & Eisen, Hammond Building, are architects.

◀ SOUTH CENTRAL ▶

City Council, Oxford, Miss., asks bids until Oct. 16 for one-story addition to municipal power plant, for electric-operated pumping station. F. G. Prout, Randolph Building, Memphis, Tenn., is architect and engineer.

Board of Education, Covington, Ky., R. W. Oelrich, acting business manager, plans new steam power plant at Holmes high school, for central heating. Cost about \$130,000 with equipment. Bond issue will be voted at November general election.

Commanding Officer, Fort Knox, Ky., has secured appropriation of \$2,617,913 for new buildings and equipment, including ordnance shops, quartermaster warehouse, gasoline storage system, gas mains, ordnance warehouse, radio transmitter building and other structures. Also \$360,000 for improvements and reconditioning, including electrical distribution system and other utilities.

Taylor & Williams, Inc., Norton Building, Louisville, has organized Taylor & Williams Distilleries, Inc., capital of \$200,000, to build new distilling plant on 20-acre tract, to include power house and machine shop. Cost close to \$200,000 with equipment. J. B. and M. J. Dant are interested in new company.

Town Council, Ringgold, La., plans installation of pumping machinery and auxiliary equipment for municipal waterworks and sewerage systems. Cost about \$60,000 including pipe lines. Financing is being arranged. E. P. Joseph, Glenmore, La., is consulting engineer.

Brown-Forman Co., 1908 Howard Street, Louisville, will carry out expansion and improvements at distilling plant, including additions for fermenting, mechanical drying and other service. Cost about \$100,000 with machinery. L. V. Abbott, 8 Kenwood Village, city, is architect.

◀ SOUTHWEST ▶

Carter Carburetor Corp., 2338 North Spring Street, St. Louis, manufacturer of carburetors, parts and kindred equipment, has awarded general contract to Fruin-Colnon Contracting Co., Merchants Laclede Building, for three-story addition, 65 x 125 ft. Cost about \$70,000 with equipment.

City Council, Springfield, Mo., is arranging financing for \$2,750,000 for extensions and improvements in municipal water plant and system, including pumping and power equipment, pipe lines, etc.

Commanding Officer, Fort Sill, Okla., has been granted appropriation of \$4,309,035 for new buildings and equipment, including ordnance warehouse, conversion of barracks into school shops, hangar, gasoline storage system, quartermaster warehouse, gun sheds, telephone system, paint and oil storage, garage and other structures.

Marth Brewing Corp., St. Louis, recently organized by H. C. Marth and associates, capital \$500,000, has taken over former brewery at 1706 South Eighteenth Street, and will modernize for new plant. Cost about \$175,000, of which over \$100,000 will be expended for brew-house, bottling and other equipment.

Common Council, Kennett, Mo., is arranging financing for \$140,000, fund to be used for new municipal electric light and power plant, using Diesel engine-generating units, and electrical distribution system. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Colonial Distilleries Products Co., Inc., St. Louis, care of L. E. Scott, 418 Olive Street, head, recently organized, plans establishment of new distillery. It is proposed to acquire local property and remodel. Cost over \$85,000 with machinery.

City Council, Washington, Kan., has been authorized to arrange bond issue of \$88,000 for new municipal electric light and power plant. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Sabinas Brewing Co., Simpson Street, San Antonio, Tex., has plans for one-story and basement addition to main brew-house, 60 x 75 ft., one-story bottling works, 50 x 100 ft., and power house, 30 x 30 ft. Cost over \$85,000 with equipment. Charles T. Aubin, Smith-Young Tower, is architect.

◀ PACIFIC COAST ▶

General Cable Corp., 420 Lexington Avenue, New York, has let general contract to Rainey & Melissac, 2100 East Twenty-fifth Street, Los Angeles, for new one-story branch plant, 152 x 322 ft., at Los Angeles. Cost close to \$200,000 with equipment. Ernest C. Batty, Pacific Electric Building, Los Angeles, is architect. Company has contract for copper cable for 271-mile transmission line for Bureau of Water and Power, Los Angeles.

Bakersfield Brewery, Bakersfield, Cal., recently organized by James B. Bower and Howard J. Scott, both Bakersfield, plans new multi-story brew-house, bottling works, mechanical-cooling and other departments, including power plant. Cost about \$160,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 17 for 16 motor-driven horizontal boring, drilling and milling machines (Schedule 788) for Puget Sound Navy Yard.

Calvino Corp., Fontana, near San Bernardino, Cal., care of Don Uhl, 520 Detroit Street, Los Angeles, architect, has plans for new winery and distillery, with two main units, 90 x 112 ft. and 40 x 75 ft. Cost about \$60,000 with equipment.

Sainte Claire Brewing Co., San Jose, Cal., has begun extensions and improvements in former brewery on Lincoln Avenue, to include new equipment. General contract let to Jacks & Irvine, 74 New Street, San Francisco. Cost over \$250,000 with machinery.

Commanding Officer, Fort Lewis, Wash., has secured appropriation of \$2,397,663 for new buildings and equipment, including ordnance repair shops, quartermaster warehouse, magazine, gun sheds, water pipe lines and other structures.


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Railroad Car Situation Involves Many Problems

(Concluded from Page 13)

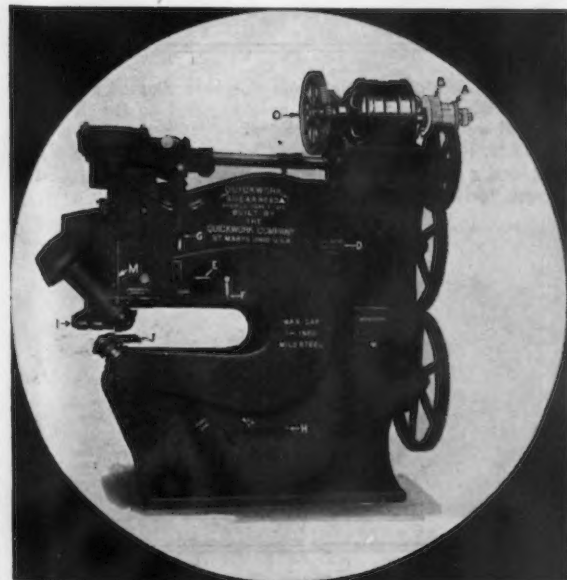
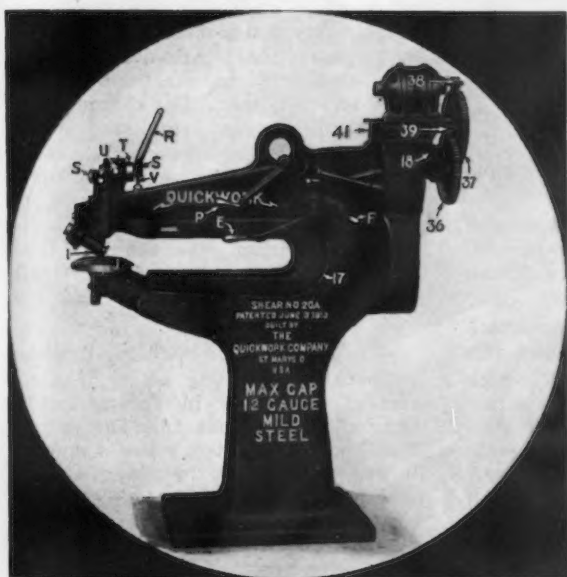
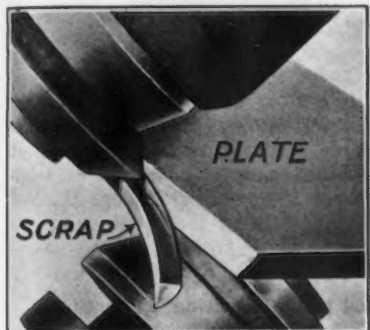
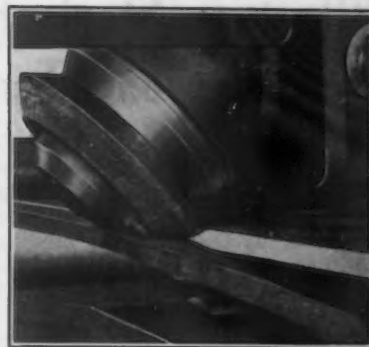
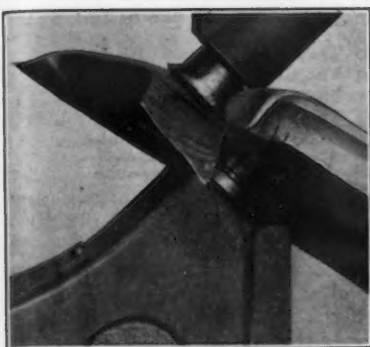
savings in operating costs, repairs and depreciation it is possible that cars constructed partly of aluminum may show ultimate economies even though the first cost is much greater than that of steel cars. The Committee on Car Construction of the American Railway Association is now studying the possibility of reducing the weight of the A.R.A. standard steel-sheathed wood-lined box car by the use of aluminum alloys. A considerable range of physical properties is available in aluminum; for example twelve different grades of wrought aluminum and three grades of cast aluminum were used in the aluminum passenger car built by the Pullman Car Mfg. Co.

Rustless Steels For Car Construction

A third class of material which affords opportunities for reducing weight and corrosion is the group of rustless iron alloys. The cost would be intermediate between that of carbon steel and aluminum. The excellent physical properties of the material and the assurance that the thickness would not be decreased by corrosion would permit the use of thinner sections. To utilize these effectively would necessitate changes in design, but this should not prove a serious obstacle. One of the experimental light weight passenger trains is being built of rustless alloys and the experience gained in this construction should be helpful in guiding further developments in the application of such material to car construction.

The railroads are not only ready but eager for new types of equipment that will enable them better to meet their operating and traffic problems. Ingenuity will be required to produce cars that will fulfill the various requirements and only actual experience can determine what construction will give the maximum net advantage. The final decision will depend on the effectiveness of the design in enabling the roads better to compete with other forms of transportation and reduce net cost, considering all items of expense. To manufacturers who can offer products measuring up to their special requirements for freight cars for the future, the railroads offer a large market for either equipment or materials.

The annual dinner of the Society of Automotive Engineers, will be held Jan. 8, 1934, in New York, during the New York Automobile Show. The S.A.E. 1934 annual meeting will be held in Detroit, Jan. 22 to 25.



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Effect on Steel of Hydrogen at High Pressures and Temperatures

CONSIDERABLE data on the effect of hydrogen on steel have been gathered by Dr. N. P. Inglis and W. Andrews, Stockton-on-Tees, England, as the result of investigations carried on over a period of more than five years. They presented the information to the (British) Iron and Steel Institute at the September meeting.

The studies were made for pressures of 200 to 250 atmospheres and at temperatures varying between 150 and 500 deg. C. (300 to 930 deg. F.). The steels tested included two of 0.12 per cent carbon, one with 0.07 per cent silicon and the other with 0.01 per cent silicon. There were also five different alloy steels: nickel-chromium-molybdenum steel, chrome-vanadium, 3 per cent chromium steel, chromium-silicon steel and 6 per cent chromium steel. The findings have a particular bearing on industrial processes requiring elevated temperatures and high pressures.

Method of Test

The method employed in these tests consisted of passing pure hydrogen at the required pressure through tubes of the steel under test. The tubes were heated to the requisite temperature, either by inclosing them in an electric furnace, or else in a steam jacket (the latter method was employed for temperatures below 300 deg. C., and the former for temperatures above 300 deg. C.). In some cases the hydrogen was passed through the tube in a continuous stream; in other tests, the tube was fitted with a blank flange at one end, filled with hydrogen under pressure, and the valve to the compressor then closed so that the tube was filled with stagnant hydrogen under pressure. In these latter cases, however, the tube was frequently refilled with fresh hydrogen (about every two days).

The tubes were continuously under the test conditions, there being no shut-downs at nights or at week ends. For most of the time the pressure was within ± 5 atm. of the stated pressure, while the maximum variation was ± 10 atm. Similarly, the temperatures in all cases were, for almost all the time of the tests, within ± 5 deg. C. of the required temperature, with a maximum variation of ± 10 deg. C.

After a period under these test conditions, each tube was removed from its furnace and a small sample ring cut from it for examination, after which the joints were remade and the tube was put back under test for a further period. The tubes were all purchased in the open market. The tubes were of different sizes, but in all cases the inside diameter was with-

in the range $1\frac{1}{4}$ to 2 in.; the wall thickness was naturally chosen to give the desired stress under the test pressure.

What Is the Danger Temperature?

The authors say as to the tests on the soft steels that no one answer can be given to the question "At what temperature will hydrogen at 250 atm. attack mild steel?" It can only be answered, they add, when a knowledge of the structure of the steel is available. Thus mild steel in the condition normally found in a large forging can be guaranteed a long life under hydrogen at 250 atm. only if the temperature is maintained below about 150 deg. C. (300 deg. F.). Smaller mild steel forgings can be heat treated to give much finer structures and can therefore be used at much higher temperatures under the same pressure conditions. "The addition of certain alloying elements to the steel," they observe, "is therefore an advantage in obtaining a more desirable structure on heat treatment, quite apart from any added resistance to attack which the elements in themselves may introduce."

The following are the principal conclusions of the investigations:

(1) At high pressures hydrogen will attack steel at much lower temperatures than those causing attack at normal pressure.

(2) In the first stage of the attack the steel absorbs hydrogen, and this will cause embrittlement even though no decarburization or disintegration has occurred. At this stage the steel can be restored to its original state of ductility by a suitable heat treatment to drive off the hydrogen. In the later stages of attack the steel becomes decarburized and fissured, with consequent very severe loss in strength and ductility.

(3) The factors which determine the degree of attack are as follows:

- (a) The temperature.
- (b) The pressure.
- (c) The stress.
- (d) The composition of the steel.
- (e) The structure of the steel.

(4) In any one steel the critical conditions giving rise to attack vary according to the structural condition of the steel, that is, according to the heat treatment. For any one steel, the best structural condition is one in which the grain-size is small, and, in general, the hardened and tempered condition is recommended.

(5) The limiting temperature giving rise to attack on mild steel may vary 50 to 100 deg. C., depending on the precise structural condition. A large thick-walled vessel, in which the desirable structural condition cannot be attained, may be attacked at temperatures as low as 200 deg. C., but smaller vessels in the same composition can be heat-treated to give satisfactory resistance at 200 deg. C.

Findings Respecting Alloy Steels

(6) The generally used engineering alloy steels, such as nickel-chromium, nickel-chromium-molybdenum, chromium-vanadium, chromium-molybdenum steel, etc., have superior resistance to mild steel. The difference in structure between large and small vessels, after heat treatment, is much less than with mild steels, since these alloy steels are more responsive to heat treatment. In the properly heat-treated condition, the limiting temperature causing attack of these steels at 250 atm. is between 300 and 350 deg. C.

(7) In connection with the limiting temperatures causing attack, the effect of variations in the structure throughout any one tube or vessel must be appreciated. For example, it has been found that even a light sealing weld may alter the structural condition of the steel in the immediate neighborhood of the weld to such an extent that attack will occur there under conditions which do not

If this huge tank had been $3\frac{3}{8}$ in. greater in diameter, it would not have cleared all of the bridges over the railroad upon which it was shipped. It is a gasoline cracking tower, 12 ft. in diam. by 80 ft. in length, having a total weight, according to the bill-of-lading, of 232,400 lb. The nominal diameter was increased to 13 ft. 10 in. by man heads and hinges. The tower contains 14 steel bubble decks, a trap-off deck and a large heat exchanger. It was built by the Graver Tank & Mfg. Corp., for the Globe Oil & Refining Co.



MACHINE TOOLS UNDER NRA



THE year has seen a substantial improvement in the machine tool trade. The low point reached was in March. Since that time orders have increased to the highest point in 20 months.

A large share of current business is the natural result of increased activity and employment in industrial fields. Repairs and replacements upon machines formerly idle are becoming increasingly necessary.

Higher wages and shorter hours under the NRA should increase, and not decrease, the necessity for modern, efficient equipment. There will, of course, be no return to hand-labor and the burdensome tasks from which the machine has freed mankind.

Moreover, changes in product specifications, due to new engineering development or shifting public tastes, may give rise to a demand for new machine tools.

Certainly the revival of markets for metal-working machinery and capital goods is as essential to general recovery as is the quickening of consumers' goods markets.

For many years the plants of the Interlake Iron Corporation have supplied foundry coke and pig iron for machine tool castings.



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cause attack of the remainder of the steel. It is necessary, therefore, to heat-treat such parts after welding.

(8) It has been shown that additions of chromium to steel progressively improve the resistance to hydrogen attack. Thus a 3 per cent chromium steel is resistant, at 250 atm., up to 400 deg. C., but is appreciably attacked at 450 deg. C. On the other hand, a 6 per cent chromium steel is resistant up to 500 deg. C. at least.

(9) Chromium-nickel austenitic steels are not disintegrated by hydrogen at 250 atm. and temperatures up to 450 deg. C., but these steels absorb large quantities of hydrogen under these conditions and consequently suffer severe embrittlement. The ductility can be restored by heat treatment to expel the absorbed hydrogen. They also undergo the familiar "boundary carbide" precipitation under these conditions.

Embrittlement by Pickling Not Necessarily Permanent

THE embrittling action produced by pickling has been studied by Dr. Ian G. Slater, Birmingham University, England, in respect to wires. Medium and high-carbon steel wires, immersed in mineral acids of various concentrations and at different temperatures, showed rapid embrittlement as soon as the wires were so treated. The rate of deterioration increased with the acid concentration and the temperature. Hard drawn wire, particularly in the large gages, seemed extremely susceptible to the embrittling effects. However, deterioration was found to proceed at a less rapid rate when an inhibitor such as flour or yeast was added to the pickle. A mixture of flour paste and stannous chloride solution proved particularly effective.

The opinion is held generally that the effects produced by pickling are due to the absorption and temporary retention of hydrogen by the metal. The manner in which absorbed hydrogen is retained and the mechanism by which it penetrates or escapes from the metal have not been definitely elucidated. What Dr. Slater set out to find was the relation of the carbon content and the magnitude of embrittlement, and he reported his investigations in a paper contributed to the September meeting of the (British) Iron and Steel Institute.

Summarized, the paper makes some notable observations in addition to those reported in the foregoing introductory paragraph. For example, the author emphasizes the temporary nature of the embrittlement, a recovery of properties being noted at both room and elevated temperatures, and the rate of recovery rapidly increasing with the temperature. Yet, he adds, there is evidence that, under certain conditions, steel wires on pickling may undergo appreciable damage of a permanent nature.

Curious Showing of Impact Tests

Notched-bar impact tests featured the studies. Such tests on a series of plain-carbon steels indicated the surprising result that in several in-

stances the steel had become toughened to a marked degree after chemical pickling in sulphuric acid or electrolytically as cathode. The maximum increase in the notched-bar impact value was found to be from 30 to 60 per cent in several of these steels. Some of the steels showed embrittlement after similar treatment.

The change in impact value depends both upon the time of pickling and upon some characteristic in each sample of steel which is yet to be defined. Recovery of toughened and embrittled specimens takes place on exposure in the laboratory atmosphere or more rapidly on immersion in boiling water.

Tensile tests showed that the properties of steels of the higher carbon contents undergo the greatest modification after pickling; the percentage reduction of area is particularly reduced and there is a decrease in the percentage elongation. A slight increase in the tensile strength was noted in all pickled specimens.

Hardness determinations, using the Brinell method, showed a slight increase in the Brinell hardness after electrolytic pickling. When examined by an impact hardness test, all samples after treatment were found to be definitely softer. Recovery of the original hardness took place after suitable exposure.

Effect of Chemical and Electrolytic Pickling

The steels examined for impact values were of acid open-hearth manufacture, and were supplied in the form of hot-rolled $\frac{1}{2}$ -in. rods. In every instance, unless otherwise indicated,

the steels were tested in the normalized condition.

Owing to limitations of equipment, a modified form of the standard Izod testpiece was adopted. This consisted of a 10-mm. bar cut circumferentially with a notch 1 mm. deep, having a root radius of 0.25 mm., with an included angle of 66 deg. A number of tests on the normalized steels showed that this form of specimen gave results averaging about ± 5 per cent of a mean value.

The machined testpieces were pickled in 20 per cent sulphuric acid solution for 2 hr. at 15 deg. C. and tested immediately. Average values of duplicate tests are given in the table.

Steel	Impact Value, Ft.-lb.	
	Before Pickling	After Pickling
A	20	24
B	14.8	16
C	10.8	13.2
D	5.3	5.5
E	6.0	6.5
F	2.9	3.2
H	2.4	2.8
J	2.3	3.3
K	1.6	2.0

An increase in the notched-bar impact value occurred in each instance after pickling. This increase is somewhat variable, and bears no relationship to the carbon content of the specimen. Microscopical examination of pickled and unpickled testpieces which had been sectioned longitudinally through the notch revealed no apparent difference either in the contour of the notch or in the metallographic condition of the metal adjacent to the surface. It is most probable, the author believes, that the apparent increase in toughness is mainly ascribable to the absorption of hydrogen on pickling.

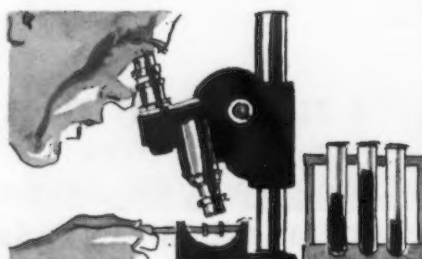
Further testpieces were pickled electrolytically as cathode in dilute sulphuric acid solution using a current of 0.5 amp. per specimen. No actual attack of the metallic surface occurs under these conditions. Steel B (0.315 per cent. of carbon) was pickled in this manner for various periods of time with the following results:

Time of Pickling	Impact Value after Pickling
Electrolytically	
Not pickled	14.8 ft.-lb.
15 min.	16.1 ft.-lb.
30 min.	20.5 ft.-lb.
1 hr.	19.8 ft.-lb.
2 hr.	17.0 ft.-lb.
3 hr.	16.0 ft.-lb.
4 hr.	15.0 ft.-lb.
18 hr.	15.0 ft.-lb.

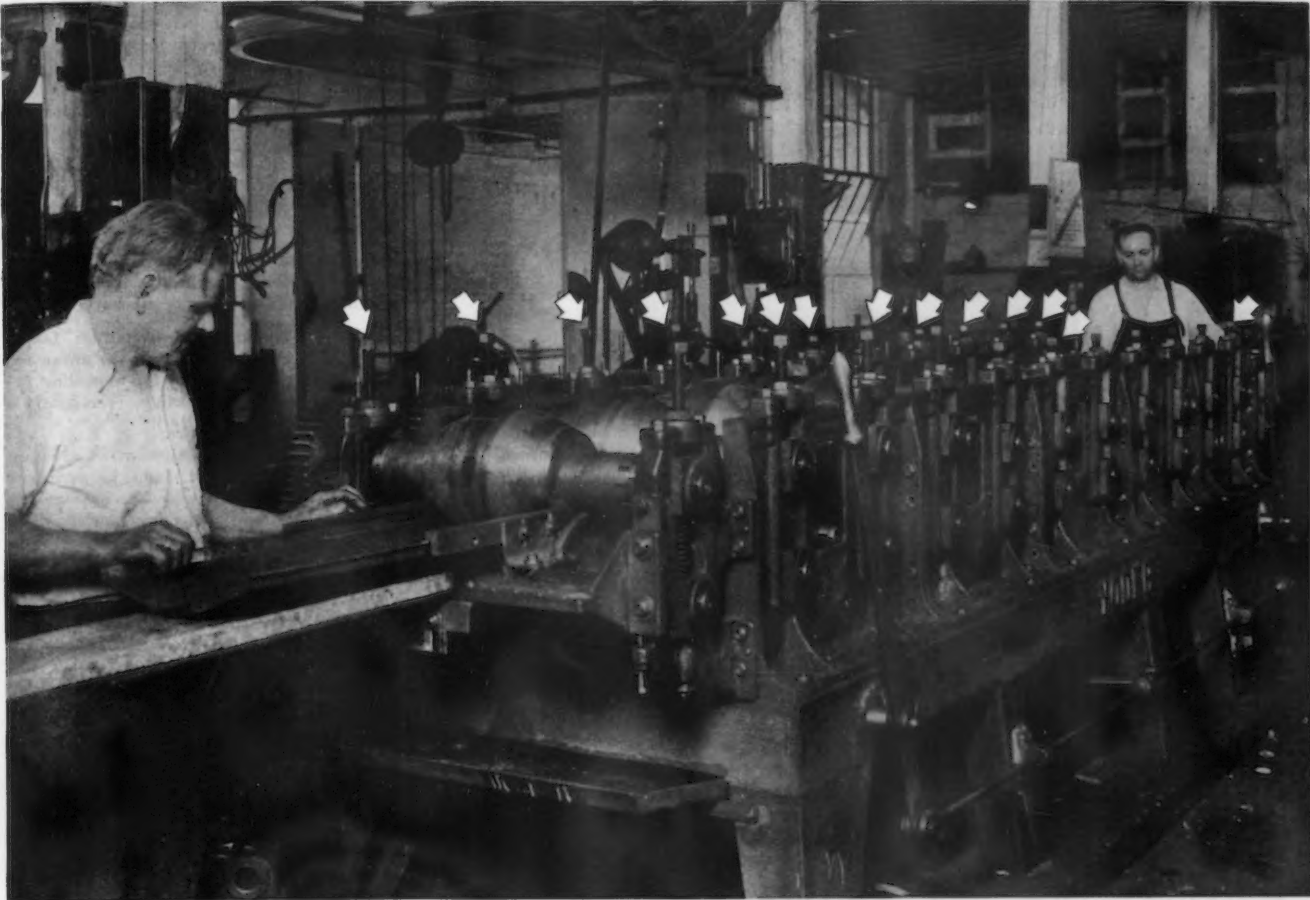
The impact value is seen to increase fairly rapidly, so that a maximum is reached in about 30 min.; subsequently a decrease is shown, so that the original value is attained after about 4 hr.

Hardness in Relation to Pickling

A 1-mm. ball, with a load of 30 kg. applied for 1 min., was used for the Brinell hardness determinations. For the dynamic hardness tests, a falling



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hammer carrying a 10-mm. ball, which gave an impact of 63 in.-lb. was employed, the height of fall being 17-15 in.

The steels were tested in the normalized condition and also in a hardened and tempered state before and after chemical pickling in 20 per cent sulphuric acid solution and electrolytic pickling as cathode. With chemical pickling, no change in hardness could be detected, the accurate read-

ing of the diameter of the impression being gradually made impossible by the acid attack and corrosion of the previously polished surface of the test sample. Electrolytic pickling as cathode showed a small but positive increase in the Brinell hardness.

It was found that the temporary hardening effect disappeared after 14 days' exposure to the laboratory atmosphere, or on immersion in boiling water for 30 min.

Heat Treating and Carburizing at National Acme Plant

(Concluded from page 17)

work from the quenching tanks and discharges it into pans; these are dumped into baskets which an electric hoist delivers to a Homo drawing furnace. The furnace is controlled by a pyrometer connected to a thermocouple located in the furnace cover. The length of draw is 1 to 2 hr., depending on the work. The basket of screws on being lifted from the drawing furnace is lowered into a 4 x 8 ft. quenching tank containing soluble oil, or the screws are allowed to cool in the air, depending on the specifications. After the work has cooled, the baskets are set on a dumping jig and turned over with a hand wheel, the contents passing through a chute into a shop pan for delivery to the shipping department.

The heat treating division of the National Acme Co., in addition to handling the company's own work, is

doing an increasing volume of heat treating work for outside companies that cannot afford to maintain a metallurgist and staff and laboratory and necessary diversified heat treating equipment.

In order to secure reliable and successful heat treating results commercially the company has found that it is of the utmost importance to have comprehensive equipment available because of the constantly growing variety of steels in commercial use, the great range of requirements as to toughness and hardness and the necessity for constant watchfulness as the parts are being handled. In order that men in these departments may keep in constant touch with work as it proceeds, the metallurgical and chemical laboratory is located in the center of the heat treating department.

TRADE NOTES

C. O. Jelliff Mfg. Co., Southport, Conn., maker of wire cloth, which recently purchased Alloy Products Co., Irvington, N. J., as mentioned in THE IRON AGE, Sept. 14, will continue to sell certain specialties formerly made by Irvington company and with which company manager is familiar.

Kron Co., Bridgeport, Conn., manufacturer of industrial automatic dial scales, has appointed following distributors to handle the complete line of equipment: Roy E. Sampson, 20 Furniture Building, Evansville, Ind.; B. F. Crawford Co., 10 North First Street, Terre Haute, Ind., and Mechanical Equipment Corp., Howard Avenue and Carondelet Street, New Orleans.

Ex-Cell-O Aircraft & Tool Corp., Detroit, has appointed A. R. Sleath, 502 Haverford Avenue, Narberth, Pa., representative in Philadelphia territory, handling company's complete line of products, including those of Continental Tool Works Division and Krueger-Wayne Tool Co. Division. Company has also named D. V. Chancellor manufacturer's representative in southern Indiana and surrounding territory, with headquarters at 1010 Bellemeade Avenue, Evansville, Ind.

Falk Corp., Milwaukee, manufacturer of

transmission machinery, has appointed T. F. Scannell, who has been St. Louis representative for several years, to Dallas, Tex., territory. He will have charge of oil field sales in Texas and Oklahoma, with office at 1410 Magnolia Building, Dallas. St. Louis territory has been taken over by Fitch S. Bosworth, 5475 Cabanne Avenue, who will represent Falk Corp. on entire line of products.

Louis Allis Co., Milwaukee, has appointed E. F. LeNoir representative, with headquarters at Allentown, Pa.

Barrett Co., 40 Rector Street, New York, has transferred its pipe coating department from Chicago to the home office in New York. George B. McComb will continue as sales manager of the department.

Vapor System Solvent Cleaning—Rex Products & Mfg. Co., Detroit. Folder describing automatic and manual machines for cleaning metals of oils, fats, waxes, buffing compounds, etc. Cleansing is performed by solvent vapor.

Beaumont Birch Co., Philadelphia, has appointed Ernest E. Lee Co., 115 South Dearborn Street, Chicago, as representative in the Chicago territory, covering the sale of coal, coke and ash handling equipment for power plants and gas works.

NEW PUBLICATIONS

Journal Lubrication.—Journal Lubricator Co., 939 West North Avenue, Pittsburgh. Folder illustrates cylindrical felt pad which is soaked in oil and held against journal by clock spring steel bands.

Saw and Knife Grinding.—Saumel C. Rogers & Co., Buffalo. Illustrated price pamphlet covering sectional wheel grinders, automatic and automatic clock control knife grinders, bench grinders, circular and band saw grinders and sharpeners.

Reduction Crusher.—Traylor Eng. & Mfg. Co., Allentown, Pa. Bulletin No. 2110 concerning new reduction crusher claims unusual power saving and low maintenance expense.

Arc Welded Wheels.—Lincoln Electric Co., Cleveland. Folder describes designing and arc welding of various types of wheels.

Pulverized Coal Uses.—Whiting Corp., Harvey, Ill. Booklet describing the advantages and uses of powdered coal for annealing furnaces, core ovens, and boilers. Equipment is also illustrated.

Hydraulic Power Equipment.—Logansport Machine Co., Logansport, Ind. Large catalog describing with dimensions and specifications line of electric hydraulic power devices, cylinders and valves, together with special equipment for air and hydraulic equipment.

Wire Rope Sockets.—American Steel & Wire Co., 208 South La Salle Street, Chicago. Folder describing briefly the simplicity and other features of the Fiege Tiger-Claw wire rope sockets, which may be attached quickly, with ordinary labor, in the field.

Refractory Products.—Standard Fuel Engineering Co., Post Avenue South, Detroit. Folder containing among other things a tabulation for the different cements and plastics of the vitrification temperature, melting temperature, use limit temperature, quantity required to fill one cu. ft. of space, amount required for laying 1000 brick, the number of square feet that can be sprayed, etc. The trade mark name Zero, President George H. Willett says, applied formerly only to the company's high-temperature cements and the like, but now is the name for all of its refractory products.

An accident prevention program, to be an unqualified success, must have the sincere interest of the management, in the opinion of P. A. Lovely, district safety inspector, Pullman Co., St. Louis. In an address before the Safety Congress in Chicago, Oct. 4, he said the "big office" must realize that its first duty is to put the house in order. While it is correcting all dangerous conditions in walks, floors, stairways and platforms, as well as safeguarding all machines, and, in general, making everything as fool-proof as possible, the employees will be taking their part by apprehending that the "big boss is safety-crazy."

Under the stimulation of public funds voted in the drive on unemployment, highway construction in the United States will proceed faster than ever before in the coming year, according to letters from State highway officials to Alfred P. Sloan, Jr., president of General Motors Corp. An all-time record highway expenditure of nearly \$2,000,000,000 between July 1, 1933, and July 1, 1934, is indicated.



Cut Down Gear Failures— *Specify* **ILLINOIS S·A·E·6150**

As produced by Illinois Steel Company, S. A. E. 6150 possesses those qualities of uniformity and high resistance to shock required for efficient gear service.

It is readily forged and annealed. It can be machined to a very fine finish. Oil hardening produces very little distortion of the part. For any parts requiring great resistance to shock and wear and for parts which must be heat treated after machining, S. A. E. 6150 is particularly valuable.

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ILLINOIS *alloy* STEEL

ALWAYS DEPENDABLE

JUST BETWEEN US TWO

Beer Racketeering, Sound Money, Jew-Baiting

IN celebration of its 100th anniversary the New York Sun is distributing facsimiles of its first issue, published in September, 1833. The advertising is quaint, consisting largely of the announcements of sailing ship lines.

The reader of 2033 will find today's advertising no less queer. The New York Tribune issued the day this is written contains a joint advertisement of the legitimate brewers, urging beer retailers to stand firm against beer racketeers. In another advertisement a plea for sound money is made by the newspaper publisher whose little boy thought it would be nice to give Jimmy Walker a sizeable pecuniary gift.

In a full page the head of the country's foremost department store advertises that he is minimizing purchases of German goods in protest against Jew-baiting by Hitlerites.

The historian of the "threnetic thirties" has a juicy assignment.

Unbloody, Unbowed

TIME was when kind words or cruel completely upset us. A rebuke spoiled an entire morning. We would go around waving a complimentary letter like one possessed. But by persevering we have learned to take it. Compared with us, the Spartan boy with the fox was hysterical. Even heavy showers of bouquets hurled at our heads leave our sang-froid uncracked. Witness:

"No publication stands higher in our estimation than The Iron Age."

—A Connecticut firm of industrial engineers.

"The Iron Age is the best paper in the world. I have been reading it since 1919."

—The head of a Boston construction company.

Ho hum.

He Said "Cancel!", and We Brag About It

"Please cancel my subscription. Have been a reader of your most valuable publication for more than forty years, and am indeed sorry to terminate our long association. Now that I am nearing my 76th birthday I feel that I must give up the pleasure derived from reading your weekly messenger."—T. J. Brown, Colorado Springs, Colo.

Our masthead bears the legend, "Established 1855." The Iron Age was two years old when Mr. Brown first saw the light of day. We have been together through three wars and a baker's dozen booms and depressions.

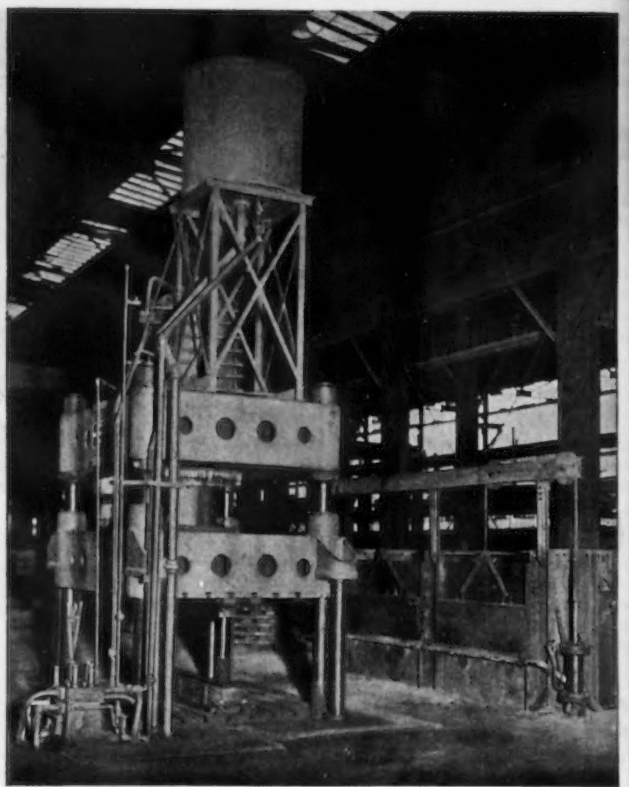
We find that the most dependable barometer that tells when good times are coming is circulation volume. It's rising. We put on more new subscribers in August than in any other August in our history, and September was the best in six years.

Strike While the Eagle Soars

THAT 32-word editorial on page 7 of the Sept. 21 issue, the one reproducing strike news headlines, attracted much attention. One manufacturer asked for copies for every newspaper in his city. Another asked for copies for all department heads. He said, "Our desire to distribute them is an expression of our enthusiasm for the very dramatic story so told."

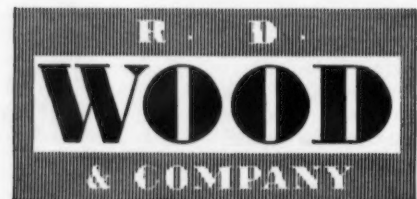
Our editors must be seventh sons of seventh sons, for if you will look back over June and July issues you will find predictions of the rash of strikes that would break out as an NRA concomitant.

—A. H. D.



Installation of a 500-ton flanging press in a well-known car shop.

IF it's a problem that involves standard or specially-designed, hydraulic machinery, operating valves, etc., talk to the "Wood" engineers about it. You can profit by their long experience in designing and building them. The reputation of R. D. Wood & Company, carefully built up during the past 129 years, is your guarantee of the highest quality workmanship and materials. Consult us about your problems. We may be able to make suggestions that will lower your manufacturing costs.



ENGINEERS—IRON FOUNDERS—MACHINISTS

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In business continuously since 1803